

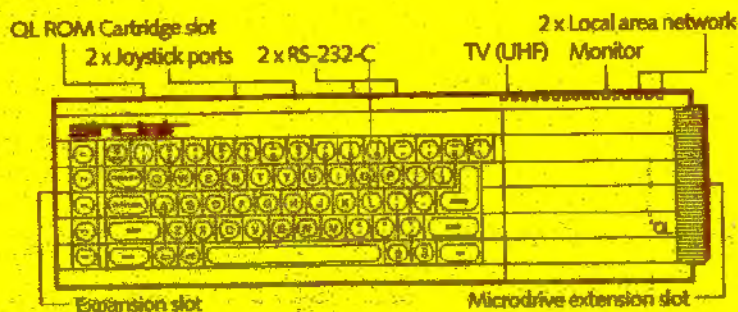
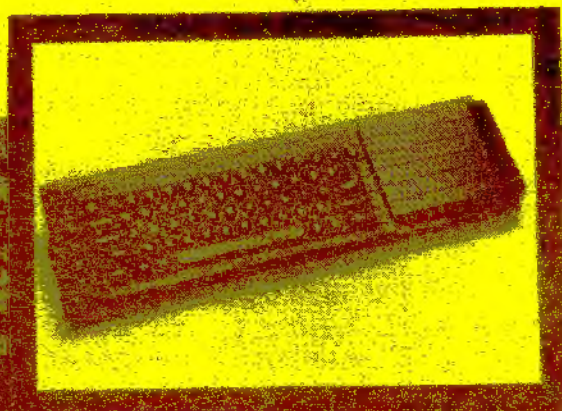
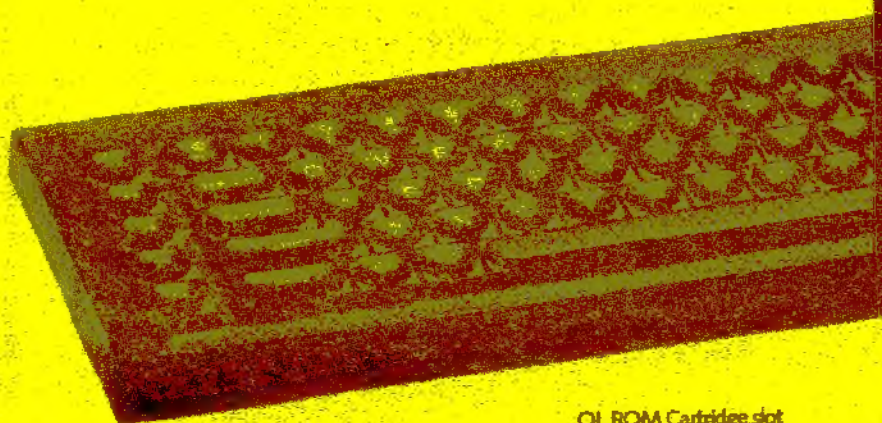
JAN/FEB 86  
VOL 2 NO 2

FOR THE T/S 2068 AND ALL OTHER  
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# Time Designs™

MAGAZINE

**JAN/FEB 86**

**TIME DESIGNS MAGAZINE COMPANY**  
29722 Hult Rd. • Colton, Oregon 97017

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## Editor's Corner

Do you still like to make and keep New Year's Resolutions? I do, and first on my list was to re-design that old TIME DESIGNS logo. Well, I had it done in time for this issue. I feel it is a big improvement to the over-all appearance of the magazine, and a trade mark to be associated with. What do you think?

A few of our advertisers mentioned to me that some of you took advantage of the new pricing, and adopted a Sinclair QL into your home (or business). Good news for you. Starting with this issue, TIME DESIGNS will feature on a regular basis, articles and information for the QL. At one time I had been contemplating a separate publication for the QL, but presently I feel this would be premature. The market is rather small right now and I think our readers would be much better served with an over-all Sinclair publication (we are a close knit bunch who understand each other). I have lined up a couple of QL writers who will be bringing us some neat features. By the way, if you haven't heard, Sinclair is discontinuing their QLUB service to American owners. Instead, they have opted to support other QL-related publications (like TIME DESIGNS).

Another QL publication that you may have received free in the mail recently, is the QL REPORT, published by Curry Computer (PO Box 5607 Glendale, AZ 85312). Rob Curry has announced that early this year, they will offer the QL REPORT on a subscription basis. I feel that their newsletter would be worth subscribing to, as they have been "pioneers" in the U.S. QL market...stocking products while we were all still skeptical of seeing the QL's arrival here.

If all of this QL talk has brought a lump to the throat of you T/S users (who have no use for this machine), you have nothing to worry about. By no means will TIME DESIGNS short you of information for your computer. You are the main reason for this magazine. This issue has more T/S stuff than ever before, and even additional pages.

CONTINUED NEXT PAGE



Although I have a QL here in the office (for testing purposes), my 2068 with disc drives practically runs this business.

I have a "special offer" for ZX81/TS 1000 users only. I have been wanting to devote an entire page to special tips and also short programs/routines that you might like to share with other users. I will print as many as possible. Would you like to see your info and name in print? Any "takers" on my offer? I hope so, as a column like this is really needed.

Well, it has been two years now since most of us were orphaned by the Timex Computer Corporation. Have you realized that the support for your computer has not diminished, but has for all practical reasons, improved? Quite an amazing story. One of the big "slicks" should do a feature story on our thriving T/S community.

Thank you Sinclair for still supporting us. Although sometimes we haven't understood you, we are very glad that your still hanging in their.

To all Spectrum (16k, 48k, Plus and 128k), QL, 2068, ZX81, TS 1000/1500, and ZX80 users...keep up the good work!

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## LETTERS

Direct all correspondence to: The Editor c/o Time Designs  
29722 Hult Rd., Colton, OR 97017

"Your readers may be interested in knowing about the availability of a relatively inexpensive full size [dot-matrix] printer. A recent catalog from: DAK INDUSTRIES, INC., 8200 Remmet Ave., Canoga Park, CA 91394, contained an ad for the GORILLA/BANANA printer for the relatively low cost of \$89.90 plus \$8.00 for P&H. Admittedly, this printer has certain limitations. It does not provide true descenders for letters with tails, but text is still very readable. In my opinion, to obtain a full 80 col. dot-matrix printer for less than twice the price of the 2040 thermal printer is well worth that error in the letter format...ads for TASPRINT claim it will provide true descenders with this printer. The ad [for the printer] did claim it was a close out, and quantities were limited so they may be all gone by now. Compatibility with the Centronics I/F and TASWORD II is demonstrated by the fact that this letter was written using them and printed on my GORILLA/BANANA printer."

Vance J Carpenter  
Fairport, NY

EDITOR: RMG ENTERPRISES, 1419 1/2 7th St., Oregon City, OR 97045, has an EPROM that replaces the one in the GORILLA/BANANA, and gives you descenders. Price is \$14.95.

"I'd really appreciate help from TIME DESIGNS or any of its many subscribers on the following T/S 1000 and T/S 2068 problems. 1000: How do you reconcile the ORGANIZER (16k) software program with a 64k RAM hardware add-on? Without upgrading the software to 64k, the 64k hardware is useless!!! 2068: How do you get the VU-FILE software program to print graphics output? VU-FILE is the software equivalent of ORGANIZER. Graphical output (white characters on black background) on the T/S 1000 by ORGANIZER is straightforward, requiring only use of the graphics key. The same is not true, however, for VU-FILE print-outs by the 2068!!! VU-FILE refuses to print-out white characters on black background."

Ed Wheeler  
534 Line Road  
Hazlet, NJ 07730

EDITOR: Those VU-FILE programs (developed by PSION of the U.K.) do have their limitations. Many users prefer other data bases that are more flexible like PRO/FILE (which has many modification possibilities). However, there is a book available, VU CALC/VU FILE (and the ORGANIZER) by Robert Masters. 165 pages cover these programs in-depth, and may have info that you are looking for. One dealer that I know has it in stock is SUNSET ELECTRONICS, 2254 Taraval St. San Francisco, CA 94116. Price is \$9.95 plus \$3.00 for total order S&H. If any readers have a specific patch for these programs, please forward it to Ed.

"I am looking for a simple Bubble Sort program for the Timex. I have seen programs for other computers in various magazines. I own a T/S 1000 with a 16k RAM pack."

Tony Bates  
Jackson, WY

EDITOR: I "dug-up" a short BASIC Bubble Sort algorithm, that you might be able to use. Lines 130 and 140 are not necessary, but allow the user to view the random numbers before they are sorted. Also, my printer's zeros don't have the usual slash, and watch out for "I" and 1 (the numeral).

```
30 REM BUBBLE SORT ALGORITHM
40 RAND
50 DIM A(20)
60 FOR I = 1 TO 20
70 LET A(I) = INT (RND * 100+1)
80 PRINT A(I)
90 NEXT I
130 PAUSE 200
140 CLS
150 LET N = 19
160 LET SL = 0
170 FOR I = 1 TO N
180 IF A(I) <= A(I+1) THEN GOTO 240
190 LET AA=A(I)
200 LET A(I) = A(I+1)
210 LET A(I+1) = AA
220 LET SL = 1
230 LET N = 1
240 NEXT I
250 IF SL = 1 THEN GOTO 160
260 REM COMPLETED SORT
300 FOR I = 1 TO 20
310 PRINT A(I)
320 NEXT I
```

"...I own a TS2068 (with ROMSWITCH) and am starting to get a collection of Adventure programs. This brings me to the point of this letter. Have you ever considered including an "adventurer's column" in your mag? I have reached a dead end in some of the adventures that I have, and on some of them I have gotten a bunch of clues. For example, I have completely mapped out Part 1 of the BACK-PACKER'S GUIDE TO THE UNIVERSE, and have found the keys for all but one lock. But I can't get past the first set of rooms in the MOUNTAINS OF KET. I hope that you will consider my proposal and try to find someone to write an article for you. I am sure that others would send in tips as they found them out, and also ask for help when they got stuck. Thanks for a great mag."

Douglas Jeffery  
Telkwa, B.C.  
Canada

EDITOR: An article or column such as you have suggested has been on the "back-burner" for awhile. I think just about everyone has at least one computer game in their software collection no matter what their computing interests are. (I am still stuck in the early part of THE HOBBIT!) Look for game tips in a future issue, as I have someone in mind for the project.

"Since in my letter [see TDM Nov/Dec '85 issue] I indicated that MC for SOUND was easy, I thought I had better include the following:

```
00030 SOUND POP HL
00035 LDI A, (HL)
00040 CP 14
00045 JP C, END
00050 JP (HL)
00055 SND PUSH HL
00060 LDI C, 245
00065 OUT (C), A
00070 INC HL
00075 INC C
00080 LDI A, (HL)
00085 OUT (C), A
00090 POP HL
00095 INC HL
```

00100  
00105  
00110

INC HL  
PUSH HL  
SND

To illustrate its use, the following is the MC equivalent of line 10 in the GUNSHOTS listing on page 195 of the USER MANUAL. The last byte, in this case 201, is really the first byte of the rest of the program. This byte is required by the SOUND sub-routine to be >=14.

```
00200 SHOT CALL SOUND
00205 DEFB 6,15,7,7,8,16,9,16
00210 DEFB 10,16,12,16,13,0,201
```

Ron Ruegg  
Baton Rouge, LA

"As I was skimming through the Sept/Oct '85 edition of TIME DESIGNS, I was "shocked" to see a joystick application program which used the exact same algorithm as mine. My first thought was: How dare Mr. Fricke (the author), use his name on my software. Then I reflected. How could Mr. Fricke have gotten a hold of my ingenious software in the first place? I hadn't even published it yet. Logic prevailed and I concluded that both Mr. Fricke and I had independently devised an identical algorithm for the same purpose; That of BASIC joystick control for the T/S 2068 computer.

...My next step was to verify if both algorithms were indeed identical. I dug deep into my vast library of 2068 programs, and low and behold, there it was; written almost two years prior with no witness to the event other than my own personal documentation. Only the variables were different. Where I used x and y as coordinates, Mr. Fricke used the more meaningful variables c and l, for column and line.

I had always intended on submitting my joystick program for publication but so far it had been easier to find an excuse not to. Although I realized this simple program could benefit the T/S 2068 community at large, I did nothing to encourage this fact. The bottom line being "I am a procrastinator" ("I'll do it later").

You can imagine my surprise then, when I saw "my" program credited to someone else's name. My first reaction was one of disbelief and surprise, followed by anger (at myself), next of jealousy and finally redemption. The next instant, I found myself vowing...which brings me to the "here and now" and "what are you going to do about it (?)".

First, I would like to commend Mr. Warren Fricke of Depew, NY, for his initiative in submitting an ingeniously efficient, yet simple algorithm for BASIC joystick control for the 2068. Commendations are also forthcoming to Mr. John McMichael of Bozeman, Montana for having inspired Mr. Fricke in the first place with his MC joystick program published in TDM (May/June '85). Credit also goes to editor Mr. Tim Woods, being first to publish these algorithms in his leading journal TIME DESIGNS Magazine.

Second, to all you prospective programmers: send in your ideas and programs. There are at least a half dozen leading American T/S periodicals, waiting and wanting for your INPUT. You have nothing to lose and so much to gain and so do we. You may even get royalties for your work if its up to standards. Do as I say, not as I do.

Thirdly, having said all that and still feeling like a "shmuck", I set out to redeem myself...elsewhere in this magazine you will find MY program on BASIC 2068 joystick control. It is an enhancement to a program with which you are already familiar (if you have read this far), and has been reproduced in full for clarity of description. I call it JOYSTICK WRAP AROUND. I trust good use will be made of it."

Martin DeBoniface  
Winnipeg, Manitoba  
Canada

EDITOR: Thank you Mr. DeBoniface for your story with a moral, and a "happy ending".



# SINCLAIR NEWS NETWORK

## 128K AND ENIGMA

Reported by R. Lussler

The 128k Spectrum (code name "Derby") has been launched in Spain, and will be available in the Spring in Britain.

Essentially two computers in one: when turned on, the 128k mode is on automatically but type "SPECTRUM", and it becomes a 48k Spectrum Plus, completely compatible with all the existing Spectrum software. The UK model will sell for about \$150.

The 128k looks like a Spectrum Plus with a big heat sink bolted on the right-hand side, and a separate [numerical] keypad attached by a coil-cord into the front of the Spectrum. A full range of ports have been included: an RS232 socket, MIDI sockets for musical instrument hook-up, RGB/composite socket and TV socket. The tape leads are on the left-hand side, and the edge connector is in the usual place. There is a SOUND chip as on the 2068 (but SOUND is thru the TV speaker and adjustable).

In the 128k mode, the keyword system is not used. They are entered one letter at a time, but keywords are retained in the 48k mode. The 128 has the capacity to act as a RAM disk system. This is a facility where areas of RAM can be set aside to store a suite of programs or sets of data, in much the same way as on the Microdrives. Access to files on RAM disk is almost as instantaneous. As an example, the command "CAT", produces an instant catalog of RAM files. There is still no sign of a joystick port.

There may be a few changes before it appears on the British market scene. It looks to be a strong base model for the new Sinclair range of models including the new portable PANDORA and the desktop ENIGMA. It is stated in the current catalog of the EMC (15 Kilburn Ct., Newport, RI 02840) that they will be carrying this great new product [Editor's Note: reportedly the English Micro Connection now has the Spanish version of the Spectrum 128k available now for \$259.95 plus \$10 P&H. The keyboard, screen text and users manual is in Spanish]. If interested, then contact them for more information.

The ENIGMA will be Sinclair's first "Mega-machiche". Sinclair believes that one Megabyte RAM is a minimum needed to compete

with Atari's ST and the Commodore AMIGA. The ENIGMA will also have two 3.5 inch disk drives. It is planned for launch in May 1986 between \$500 to \$1000 price range. The programs QUILL, ABACUS, ARCHIVE and EASEL will be on ROM. It will also have full window, icon and mouse environment, as well as GEM (used on the APRICOT computer). The Enigma will be sold as a complete package. This will include software, drives, mouse, color monitor and printer. It may also develop the addition of phone and communications work station.

## AN AMERICAN ORIGINAL

Most colorful and popular arcade-type game programs are instantly associated with the British Spectrum. Until now that is. An American programmer, John Coffey of Scottsburg, Indiana, has developed a brand new arcade game called "DIAMOND MIKE", for the un-modified 2068. This is the first program of its genre, written in 100% machine code, that has been released here especially for the 2068, in the last two years. Due to the author's thoughtful placement of code in memory, Diamond Mike also runs on the Sinclair Spectrum (or 2068 with Emulator). Mr. Coffey is the owner of a software company called JRC SOFTWARE. He has also written the 2068 COMPASS assembler/compiler package, the T/S 1000 SUPERTAPE, and 2068 GREAT GAMES and GRAPHICS SHOW.

DIAMOND MIKE (as the name suggests) is a cute little character who craves diamonds. He impatiently stamps his foot, waiting for you to guide him thru the diamond mine. All along the way are boulder-sized obstacles that could have "deadly" results. There are also attacking amebas and butterflys (?) to watch out for. The game has a lot of personality, and is addictive.

On the same tape is a bonus program called CAVERN. It is a space game imported from Canada. There is also an "electronic" catalog, that describes other programs being offered by JRC Software. An impressive (and unique) feature of Diamond Mike, is the users ability to SAVE a short demo version of the game to pass along to a friend. Over all there are 22 different screens/puzzles,

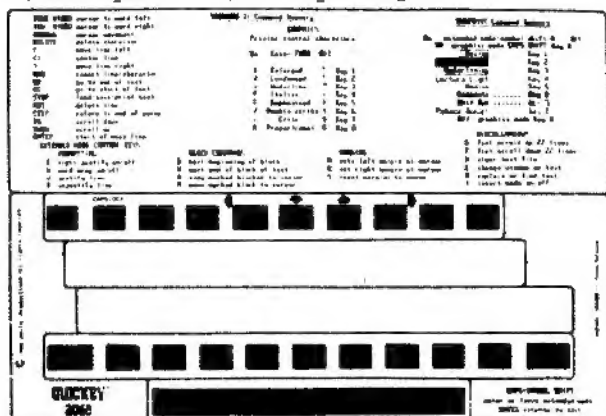
and six levels. At its \$17.95 price, JRC Software (PO Box 448, Scottsburg, IN 47170) will be selling lots of DIAMOND MIKE copies this year.

## QUICKEY 2068

QUICKEY 2068 is a series of keyboard overlays that assist the user in remembering important commands for selected popular programs like TASWORD II and MSCRIPT. The overlays are made of durable plastic and have the commands printed on the top-most section (above the keyboard), so the user does not have to glance down at the keyboard itself.

The Tasword version of Quickey 2068 includes commands for TASPRINT. Other overlays will be available soon, for programs like OMNI-CALC, etc. There is also a blank model available that the user can customize to suit any need.

AN-TO PRODUCTIONS (9009 West Elm St. #2 Phoenix, AZ 85037) is the developer and distributor of the Quickey 2068. Prices for the Tasword and MSCRIPT versions are \$3.99 each plus 50¢ for postage. Blank overlays are \$3.00 each. Any two versions can be ordered for \$7.50 plus 50¢ for postage.



LARKEN ELECTRONICS, RR#2 Navan, Ont., Canada K4B 1H9, has a disk drive controller board for the 2068 that is Spectrum Emulator compatible. Single drive version is priced at \$95.00 (U.S.) plus \$6.00 postage. A modification for second drive will be available by February 1986.

Two issues of EXTENSIONS are available to upgrade PRO/FILE 2068 with a third soon to be released. A total of two dozen enhancements, improvements, and corrections are provided, including automatic updating of files and a data save. The upcoming third issue, when combined with the first two, will make profile Spectrum/Emulator compatible. Extensions are \$6 each from Robert C. Fischer, 221 Scoggins St., Summerville, GA 30747.

Uncased new T/S 2050 MODEM CARDS are available from GLEN D. CLIFFORD, 13910 Hall-dale Ave., Gardena, CA 90249, for \$25 each. The circuit cards are reported to be 100% operational and include the interface connector and phone line cord. The user must supply a 9 volt power supply, modem software (such as the readily available MTERM), and an optional case. There is a 10 day exchange privilege.

SIMULUSION, Box 2382, La Jolla, Calif., 92038, is closing out all of their software packages for the ZX81 and T/S 1000. Titles like CLASSIC GAMES and BANNER/MESSAGE BOARD, come "bubble-packed" and complete with instructions. Prices start at 99¢! A catalog is available upon request. SIMULUSION now has a list of entertainment software for the Sinclair QL. Write for further information.

Many new products for Timex/Sinclair micros will be unveiled this year by ZEBRA SYSTEMS INC., 78-06 Jamaica Ave, Woodhaven, NY 11421. TECH-DRAW JR. is their first new release this year. Tech-Draw Jr. is similar to the original TECH-DRAW, except this version uses a standard joystick instead of a graphics tablet to control the software's functions. It supports most popular printers and interfaces. Price is \$19.95 for cassette and \$24.95 for Zebra 3" diskette. Add \$3.00 for postage (total order). During the first quarter of 1986, Zebra Systems will enhance their popular 2068 Disk Drive System with optional Spectrum software compatibility and a CP/M compatible operating system. Their inexpensive SPECTRUM EMULATOR CARTRIDGE will be available in an enhanced version with "pull-up" resistor pack for \$29.95. During the month of January, Zebra is having an inventory clearance sale. Example: T/S 1000 and 2068 versions of ZEBRA TALKER (a voice synthesizer), normally priced at \$69.95...

Continued next page

## PRODUCT NEWS

The OLIGER 2068 FLOPPY DISC INTERFACE is available now. The interface consists of two boards that plug into the OLIGER 2068 EXPANSION BOARD. Disc Board "B" contains JLO SAFE, the disc Basic eprom. At a later date, an advanced DOS written by Ray Kingsley of SINWARE, will be available. Package price for both "A" and "B" boards: \$97.95 for kit, and \$119.95 assembled/tested. The required Expansion Board is \$43.95 for kit version, and \$54.95 assembled/tested. For further information write to The John Oliger Co. at 11601 Whidbey Dr., Cumberland, IN 46229.

is \$35.00 during the sale.

PERIPHERALS DIRECT LTD., PO Box 3301, Northbrook, IL 60065, has the heavy-duty AMDEK DXY100 X,Y PLOTTER for \$125.00 plus \$10 for postage. The Amdek Plotter is the "flat-bed" type, 360mm x 260mm plotting surface, and includes a Centronics port. Great for 2068 graphics.

Jack Dohany, 325 O'Connor St., Menlo Park, CA 94025, has an interesting concept for selling his software. "For each program you may pay me what you feel is fair...I suggest a nominal \$5.00 per program, and less for upgrades." For a list of Jack's programs and enhancements of some popular software, send a legal SASE.

## HAM RADIO

The TIMEX/SINCLAIR AMATEUR RADIO USERS GROUP (TSARUG) has organized a FIDO NETWORK node to serve the members of the organization and others who are interested. Messages can be sent to network 15 node 1006. The bulletin board can be accessed directly at

(505) 646-5194. Files that are available include early copies of articles to appear in QZX, the groups newsletter. For more information, send SASE to Alex F. Burr K5XY, 2025 O'Donnell, Las Cruces, NM 88001.

## COME TO THE FAIR

Plans are being finalized for the MIDWEST TIMEX/SINCLAIR COMPUTERFEST to be held in Cincinnati, Ohio on May 3 and 4, 1986. On hand will be vendors, services, and users groups. Also planned are classes and lectures by guest speakers, hardware and software demonstrations, and a "swap-shop". A major goal for the T/S COMPUTERFEST is to introduce the wide scope of products and services available for the discontinued T/S line of computers, and perhaps new practical uses for these computers. For further information, contact Jack Roberts of the T/S Connection, 3832 Watterson Ave, Cincinnati, OH 45227, or Frank Davis, 513 East Main St, Peru, IN 46970 (Compuserve I.D. #75525,1324) Make plans now to attend!

## WHY THE QL?

### REASONS WHY YOU SHOULD TAKE THE QUANTUM LEAP

by Mike de Sosa

Why should you consider the purchase of a SINCLAIR QL? Why, possessed of an excellent and only recently fulfilled system such as the Timex/Sinclair 2068, should you go to all the trouble and expense of switching systems--just think of the problem in transcribing your current files to Microdrive format? And why purchase a system that Sinclair Research doesn't seem proud enough of to advertise, and which some have said is Uncle Clive's first computer failure? Why opt for the QL instead of your current system, another reasonably priced wunderkind computer such as the new Atari, Commodore, or Amstrad, or, perhaps, a somewhat more expensive IBM PC-compatible? Finally, why consider a system which reviewers have generally panned? There are many excellent and indisputable reasons why you should consider such a purchase. Here are a few. There are many others.

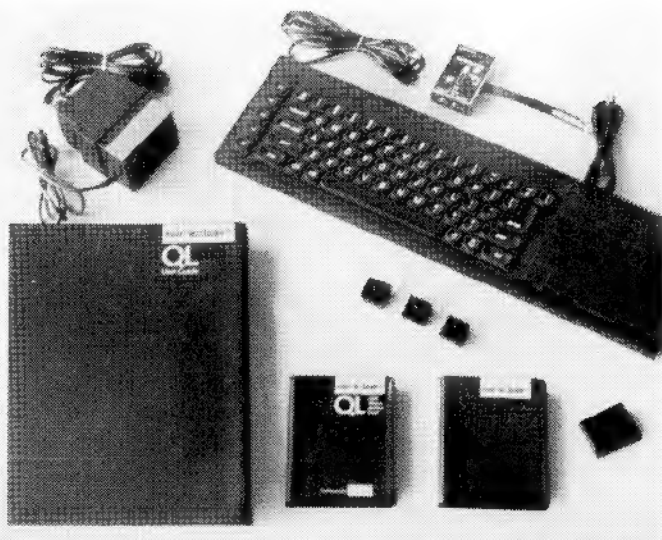
### A Best Buy!

At the moment--and things do change--the Sinclair QL, with its compact and efficient keyboard console, its 32-bit CPU, its twin Microdrives, its excellent operating system and highly regarded SuperBASIC, its exceptional "bundled" software, its comprehensive user guide, and finally, its available hardware and software support, is a "best buy" by a considerable margin at \$299. The U.S. version of the QL, its firmware, and its four semi-integrated software programs--now in their fourth or fifth version, comprise a mature and thoroughly debugged system for which dozens (who really needs thousands?) of excellent software programs and numerous state-of-the-art expansion and mass-storage systems are now available.

### The QL Keyboard Console

The 3-pound keyboard console--a triumph of design and engineering, recognized as such by the Museum of Modern Art--includes all QL components except a separate one-pound power supply. QL components include two CPU's, the 32-bit Motorola 68008 (cousin to that in the Apple Macintosh) and the 8-bit Intel 8049; four additional Sinclair-designed ICs; a full-sized, 65-key QWERTY keyboard, first-class in most respects but with no numeric keypad; twin, built-in Micro drives; expansion ports for extra RAM, disk





This is what you get for \$299. photo by Mike de Sosa

drives, Microdrives, and peripherals; a ROM-cartridge port; two complementary joystick ports; two RS-232C serial interface ports, one optimized for output, one for input; an RGB monitor output providing 512 by 256-pixel definition in four colors; a TV output providing 256 by 256-pixel definition in eight colors; and two local-area-network ports by which up to 64 QLs may be connected in series to function interactively. All in all, the QL is remarkably compact, light, versatile, and powerful--it is the first lightweight, low-cost super-microcomputer, about which more later.

#### The QL ROM

The QL's 48K ROM, expandable to 64K with a ROM Cartridge, consists of the QDOS (the QL operating system) and SuperBASIC, a major advance in computer languages. The QDOS is classified as "single-user, multi-tasking, time-sliced system" with "device-independent input and output." What is all of this gobbledygook in simpler terms? The QDOS, by assigning time to two or more programs in separate, minute increments of ms. (microseconds), can run several programs simultaneously (or what seems like simultaneously). The source of program input or destination of program output may be specified when the program is run, obviating the need for duplication of effort in, for example, writing a program to send data alternatively to a monitor, printer, modem, or another networked QL. The QDOS also provides for multiple, and independently functioning "windows" on your monitor screen, with each displaying the data for a particular program.

#### The QL RAM

The QL offers a respectable, if not overly generous 128K of RAM, expandable in

64K, 128K, 256K, or 512K increments to a maximum 640K. (The QL video circuits require 32K of RAM, leaving 96K of RAM available for program and data; QL software programs may occupy upwards of 80K.) Two British firms are now replacing the two 64K RAM chips of the QL with two 256K chips, creating a Super QL with 512K RAM internally (the cost, \$225 to \$275). More than one million separate addresses (line numbers) are available in any QL RAM option.

#### QL SuperBASIC

A major innovation which some have suggested is the profound contribution of the QL system is Sinclair's high-level, artificial language, SuperBASIC. More than an expanded Timex/Sinclair 2068 BASIC, SuperBASIC offers much greater flexibility than previous versions. User-defined procedures and functions--callable by name without reference to line numbers--may be used to extend an already much-enlarged SuperBASIC vocabulary. Data is more readily transferred between variable types, with string variables accepting numeric data and vice versa. Repetition, branching, decision-making, and other logical and array-handling procedures are improved. And the very mechanics of programming itself are automated. (Some, like the writer, will miss the "smart cursor" and single-keystroke aspects of previous Sinclair BASICs, but this sacrifice is acceptable considering the improvements.)

#### The QL Microdrives

Two built-in Microdrives are at one time the Achilles' Heel of the QL and the key to its success. Much criticized at first but now relatively trouble-free, the tape drives operate superbly together to provide all the file flexibility and bulk storage you may ever need. Later versions provide, on average, about 115K of data storage (that is about 20,000 words) per Microdrive cartridge. Up to six external Microdrives may be connected, but the trend seems to be toward adding disk drives which operate in conjunction with the Microdrives. The four QL "bundled" software programs each load in less than twenty seconds.

After much deliberation, I have decided to forego disk-drives and expand my QL's RAM, externally, to 512K. (External RAM cards are transferrable to other QLs and now operate a little faster than built-in RAM modifications.) I may get one "external" Microdrive to better facilitate file backup and database operations. External QL Microdrives are not yet available.

#### QL "Bundled" Software

The four software programs that come

packaged with the QL at no extra cost are all first-class--two of them are genuinely superb (QL Archive, a database program, and QL Easel, a business graphics program). QL Quill, a "what you see is what you get" word processor, is very easy to use with only minor flaws that will, no doubt, be corrected in later versions. QL Abacus is a spreadsheet program, limited only by the maximum size of its grid and the absence of built-in statistical functions.

QL Archive is a "smart" filing system, programmable in its own command language, that is open-ended in its capabilities, limited in scope only by RAM available. More books and articles have been written regarding the applications and use of Archive than about any other QL software program, and this will continue to be the case. Not as easy to use as the other QL software programs, Archive is capable of automatically extracting desired data from several different files, manipulating and ordering it in complicated ways, and producing finished screen or hard-copy reports in any format desired.

QL Easel is the reviewers' favorite QL software program. It has been suggested that every organization with a need to produce 35mm color graphics should own a QL, if only for that purpose. Simple to use, QL Easel produces graphics suitable for business, governmental, academic, or private use in eight basic formats, each one of which can be tailored to your preference in almost every way. Backgrounds, bars and lines of every sort, pie-chart segments, and annotations may be selected from many choices offered, or designed from scratch.

The programs are semi-integrated in their present version. To be fully integrated, all programs would have to be loaded in RAM at one time--occupying about 300K of RAM without their data files. But this too may change in later versions designed for use with QLs with much larger RAMs. All QL software programs--are comprehensively self-documented in on-line HELP facilities which take you directly to the information needed and return you precisely to the same spot in the program from which you called for help. The QL is User-Friendly

The QL's 32-bit CPU is designed to run several complex programs rapidly, but a spinoff of this chip architecture, perhaps more important in the long run, is that programs can be designed to be very simple in operation. And that is what has been done in the case of the QL and its bundled software. The QL and its software are designed to be

used effectively by those with no prior computer experience and those who have not previously met with success using a computer. Other QL Software

More than a hundred serious and recreational programs are now available in the U.K., with emphasis on the former. Most of these should be available from suppliers in the U.S. soon. Those available now include the following: several full-accounting systems; project-planning, decision-making, and other business-oriented programs; several excellent graphic arts programs; compilers for more than a dozen other programming-languages, including a revolutionary compiler for converting a SuperBASIC program to machine code; many educational programs; numerous utility programs which expand Super BASIC and facilitate routine operations, one in a manner that apes the Apple Macintosh; all sorts of games including excellent road-racing, bridge, and backgammon simulations, and two you-must-see-to-believe tennis and chess simulations from Psion Limited (producers of the QL software programs), the



photo by Sinclair

latter the '84 Microcomputer Chess Champion; and other programs of every sort.

#### Third-party Hardware for the QL

Numerous state-of-the-art disk and expansion systems have been designed for the QL, including CP/M systems if that is your bag. The best of these will be marketed here --all at prices generally much less than those for other comparable systems.

#### The Future of the QL

Although the folks at Sinclair Research USA won't tell, I believe that the QL in its present form will be a relatively long-lived computer perennial. There is some talk of a QL modification with expanded RAM, and a

built in 3 1/2-inch disk drive, perhaps with the four QL software programs integrated as part of ROM. But this may not happen, or happen soon. Besides, if you purchase a QL now only to be confronted with a superior version later, you can always network your old QL with your new one.

European users of the QL had to wait many months for the bugs to be exterminated from the QL ROM, the Microdrives, and the QL software programs, and for compatible peripherals and software to appear. And the price of the QL was higher then. We now have a mature system with lots of backup offered to us at a bargain price.

I don't know whether the Sinclair QL will be a market success in this country. I

only know that the QL as the first lightweight, low-cost supermicrocomputer--a technological and historic watershed that may foreshadow revolutionary changes in most aspects of the computer world--deserves to be a success. Any questions?

Next time--programming in SuperBASIC on the Sinclair QL.

MIKE DE SOSA is a retired Air force officer, with a Ph.D. from the University of Oregon, who has completed a comprehensive book on the QL and its software, and is now looking for a publisher.



## ADVENTURES IN THE RAM JUNGLE AND OTHER MYSTERIES

### CONCLUSION

by Earl V. Dunnington

The results presented in this article were obtained with a T/S 1500 and may differ from those obtained with the T/S 1000 without a 16K RAMPACK.

The readers with a T/S 1500 and those with a T/S 100 who own 3.25K or more of RAM have their choice of three trails (Operating Modes) they can use to traverse the RAM Jungle:

1. Both the Actual RAMTOP and the system variable RAMTOP set at or above address-19712.
2. Actual RAMTOP at or above address 19712, but the system variable RAMTOP POKEd to less than 19712, without ENTERing NEW.
3. Both the Actual RAMTOP and the system variable RAMTOP set below address 19712.

In all of the modes the program must be able to operate in the amount of RAM, to which Actual RAMTOP is set. Actual RAMTOP is one address higher than the top of the GOSUB stack (GS stack). Both Mode No.1 and Mode No.3 have a sub-mode available where the system variable RAMTOP is POKEd to an address

less than the Actual RAMTOP without ENTERing NEW. The T/S 1000 without an additional RAMPACK, has 2K RAM (maximum Actual RAMTOP address 18432) and can only use Mode No. 3 and Submode 3. The Submodes are used in a program when it is designed to store data or machine code in the Safe Area with NEW in a program line so that the strings and variables, along with the program, will be destroyed, in order that a new program can be LOAded that will utilize the data or machine code. Mode No.2 can also be used for this purpose. The main use of Mode No.2 is to save memory when a program will not operate in less than 3.25K RAM and a full screen is not used in the program. Mode No.2 can also be used when recording a program in order to save time or tape, as there are 768 bytes less in the display file to be recorded. Mode No.3 can also be used for this purpose. A program SAVED while in Modes 2 or 3 can be LOAded into the computer when it is in Mode No.1.

Part One of this article (published SEPT/OCT '85) covered the GOSUB and Machine stacks also determining the upper limit of the Safe Area. Part Two of the article (pub-



lished NOV/DEC '85) covered the Calculator Stack (C stack) and determining, while in Mode No.1, the lower limit of the Safe Area and the minimum setting for RAMTOP, that would allow the program to operate. If a program will not use a full screen display, RAMTOP can be set even lower, saving additional memory above RAMTOP for storage of data. To determine this absolute minimum setting for RAMTOP that will allow the program to RUN and the computer to act normally, we can use either Mode No.2 or, if the program will operate in less than 3.25K of RAM, Mode No.3. For the purposes of illustration of the features of Mode No.2 to those readers with 3.25K or more RAM, we will use this mode for them. Readers owning the T/S 1000 but only 2K RAM will also be able to join in RUNNING the examples, and obtain similar results.

Readers with more than 16K RAM, set RAMTOP to 32768 as follows:

```
ENTER POKE 16388,0
ENTER POKE 16389,128
ENTER NEW
```

All those readers with 3.25K RAM or more are now ready to cross over the Great RAM Divide, located at address 19712, into the domain of less than 3.25K RAM. We will do this by POKEing the system variable RAMTOP to address 18432 (the same as if we had 2K RAM) without ENTERing NEW as follows:

```
ENTER POKE 16388,0
ENTER POKE 16389, 72
ENTER CLS
```

A minimal display file has now been set up, but Actual RAMTOP is still 32768. To prove this, ENTER the following: PRINT PEEK 18431. The top of the GOSUB stack marker, decimal no. 62, will not be printed on the screen. If you PRINT PEEK 32767 it will be printed on the screen.

To prove that a minimum display file has been set up, PEEK the system variables VARS and D\_FILE by ENTERing the following:

```
PRINT (PEEK 16400+256*PEEK 16401
)-(PEEK 16396+256*PEEK 16397)
```

The value displayed should be 25, the number of bytes in a minimum display.

To find the absolute minimum address to which we can set RAMTOP for Program One that we used as an example in Part Two of this article, we must type in the program and SAVE it on tape while in Mode No.2 (T/S 1000 2K RAM in mode No.3). Type in Program One as follows:

```
10 FOR N=1 TO 48
20 PRINT PEEK 16412+256*PEEK 1
6413;" ";
30 NEXT N
```

SAVE this program on tape.

As we want a completely clean memory in order to determine the upper limit of the Safe Area for Program One while in Mode No.2 (or 3), turn off the computer. Then power up. Those with over 16K RAM, set Actual RAMTOP to 32768 as covered above. All but those with 2K RAM, POKE the system variable RAMTOP to address 18432 without ENTERing NEW as you did before. Everyone LOAD and RUN Program One. Your results should agree with Figure No.1. Each time through the loop the program prints the value contained in the system variable STKEND and illustrates how everything above the expanding display file is moved up in memory. Find the upper limit of the Safe Area by PEEKing the addresses below RAMTOP-50 until you find the start of the Addresses containing only zeros. This should be 32715 for Mode 2 or 18379 (Mode 3).

PEEKing either the system variable STKEND or STKBOT using the direct double PRINT PEEK command, you should get 16667. We will investigate the reason for this value later.

Looking at Figure No.1, the first two values in line one and in line nine are not the addresses of the top of the C stack. They are due to a "Giant Bug", because the system variable STKEND is used by the Wicked Wizard of ROM for some other purpose than pointing to the address of the top of the C stack. What about the other values of Fig. No.1? Change line 20 of Program One to read:

```
20 PRINT PEEK 16410+256*PEEK 1
6411;" ";
```

Each time through the loop the value stored in the system variable STKBOT will be printed. RUN the program and your results should agree with Figure No.2. Each time an address is printed, the bottom and the top of the C stack are moved up another six addresses as the display file is expanded by that amount. Note the correlation between Figures No.1 and No.2. The addresses in Figure No. 1, other than the first two of lines 1 and 9, are the same as those in Figure No.2, and are actually the addresses of the bottom of the C stack. Therefore we cannot locate the top of the C stack while the program is RUNNING by inserting a line in the program to PEEK STKEND.

Let us investigate why we get 16667 as the bottom of the C stack using the direct

command to PEEK STKBOT or STKEND when the programs print the last value as 16912. When a direct command is ENTERED, the first thing that happens is the screen is CLEARED. As we are dealing with a minimal display file, the C stack is moved down before the command picks up the value stored in STKEND or STKBOT, so we must add the number of characters on the screen to the 16667. The last six characters (including the space) are printed after the value is picked up. Therefore we have:  $9 \times 32 - 6 = 282$  characters. The direct double PEEK command, as we found in Part Two of this article, increases the result by thirty-seven, so it must be subtracted. Therefore:  $16667 + 282 - 37 = 16912$ . Which is the same as the last value of Figures No.1 and 2.

We can locate the maximum address of the top of the C stack during the RUNNING of the program by laying down some fly-paper with Program Two of Part Two of this series. Changing line 10 to fit the new addresses, the program now reads as follows:

```
10 FOR N=16912 TO 17150
20 POKE N,5
30 NEXT N
```

N is from the last address to the highest address in Fig. No.1. The program places a 5 in each address from 16912 to 17150.

1) Type into the computer lines 10 and 20 of Program Two which will wipe out these lines of the previous program.

2) RUN the program

3) ENTER CLEAR

4) LOAD Program One from tape

5) RUN Program One

6) ENTER CLEAR

7) In Mode No.2 (or 3), with 288 bytes of screen display used, we do not have to delete any program lines.

8) Using the direct command: PRINT PEEK n Where n is the address to be PEEKed, find the highest address without a 5. This address should be 16932 and is the top of the C stack when Program One is RUN and the computer is in Mode No.2 (or 3).

The formula for computing the minimum address to which we can set RAMTOP and have the program RUN and the computer act normally, determined while in Mode No.2 (or 3), is: Top of the C stack + Actual RAMTOP - Upper limit of Safe Area + 36

Substituting the addresses we found:

For Mode 2

$16932 + 32768 - 32715 + 36 = 17021$

For Mode 3

$16932 + 18432 - 18379 + 36 = 17021$

The High Byte of 17021 is:

$INT(17021/256) = 66$

The Low Byte of 17021 is:

$17021 - 256 \times 66 = 125$

To set RAMTOP to 17021:

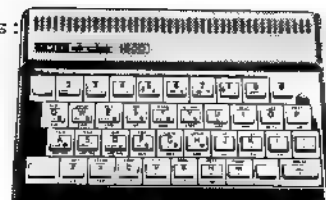
ENTER POKE 16388,125

ENTER POKE 16389,66

ENTER NEW

LOAD Program One from the tape and the program will RUN properly.

As repetition is the core of learning, let us find the minimum setting for RAMTOP of a more practical program. Figure No.3 is an outline for a "bare bones" text entry program. When complete, it will display the text as it is entered, and store the text above RAMTOP. Line 80 redefines the ENTER key as the SPACE key, because both the PAUSE and INKEY\$ functions turn the SPACE key into BREAK when shifted or unshifted. To quit text entry, use STOP. The STOP is stored as the end of the text marker (line 100). The



```
16908 16902 16942 16648 16654 16
16916 16608 16672 16678 16684 16
0 16908 16708 16708 16714 16720
16908 16732 16738 16744 16750 16
16908 16738 16738 16774 16780 16
0 16908 16708 16804 16810 16816
16908 16828 16834 16840 16846 16
0000 16858 16864 16870 16876 1688
0 17144 17150 16908 16908 16912
```

FIGURE NO. 1

```
16910 16636 16642 16648 16654 16
660 16608 16672 16678 16684 16
0 16608 16708 16708 16714 16720
16910 16738 16738 16744 16750 16
16910 16708 16708 16774 16780 16
0 16910 16708 16804 16810 16816
16910 16828 16834 16840 16846 16
0000 16858 16864 16870 16876 1688
0 16910 16804 16900 16906 16912
```

FIGURE NO. 2

```
5 FAST
10 LET A=0000
20 LET B=INITIAL RAMTOP-1
30 LET C=1
40 SCROLL
50 FOR N=A TO B
60 PAUSE 32767
70 LET D=CODE INKEY$
80 IF D=118 THEN LET D=0
90 POKE N,D
100 IF D=227 THEN STOP
110 IF C=33 THEN GOTO 140
120 SCROLL
130 LET C=1
140 PRINT CHR$ PEEK N,
150 LET C=C+1
160 NEXT N
```

FIGURE NO. 3

minimum value for A in line 10 is what we need to determine.

1) To avoid crashing the computer, temporarily change line 90 to:

```
90 POKE 16393,0
```

This continually POKES the text to an unused location in the system variables area. We must also change line 140 to:

```
140 PRINT CHR$ PEEK 16393;
```

2) Power up, ENTER line 90, and find the no. of bytes in the changed line by PEEK-ing 16511. In the same manner, find the number of bytes in the original line 90. The difference is 10. Find the difference between the changed line 140 and the original line 140, the difference is also 10.

3) Assuming we do not know if the program will RUN in less than 3.25K RAM, readers with this amount or more should chose Mode No.2 in determining the minimum setting for RAMTOP. To set Mode No.2, ENTER:

```
POKE 16388,0
```

```
POKE 16389,72
```

```
CLS
```

4) The Final value for variable A in line 10 will be the minimum setting for RAMTOP+1. Temporarily, since we will be working in Mode No.2 (or 3) and we need to exactly fill the screen with text, so that the display file will be expanded to the maximum for 22 lines, we will use  $A=B-703$  bytes. Change line 10 to read:

```
For Mode 2
```

```
10 LET A=32064
```

```
For Mode 3
```

```
10 LET A=17728
```

5) Change line 20 to read:

```
For Mode 2
```

```
20 LET B=32767
```

```
For Mode 3
```

```
20 LET B=18431
```

6) Type the program as changed above into the computer and record the program on tape, while the computer is in Mode No.2 (or 3).  
7) To insure a clean memory, turn off the power. Power up. Set Mode No.2 as in 3 above (3.25K RAM or over only). LOAD the "Text Entry" program. RUN the program, typing in text until the screen is filled and you get a 0/160 report. There is no cursor or correctional features!

8) Find the upper limit of the Safe Area by PEEKing the addresses near RAMTOP-50. This will be 32717 (T/S 1500 Mode No.2) or 18389 (T/S 1500 Mode No.3, Actual RAMTOP at 18432) As you can see, setting Mode 3 in the T/S 1500, not only sets up a minimum display file, but also changes the operating system as regards the M stack. To be on the safe side, never use a value for the upper limit

of the Safe Area less than RAMTOP-51.

9) To find the initial value for N in the "Flypaper" program, ENTER:

```
PRINT PEEK 16404+256*PEEK 16405
```

The value of the address of E\_\_LINE is 16838 To this add 704 which is the number of addresses E\_\_LINE is moved up when the display file is expanded. The top of the C stack should never be more than 50 addresses higher than the actual address of E\_\_LINE during the program RUN.

10) To wipe out the program, turn the power off and then on. Set Mode No.2 as in (3) above. Type in the modified "Flypaper" program:

```
10 FOR N=17542 TO 17592
```

```
20 POKE N,5
```

```
30 NEXT N
```

RUN this program.

11) ENTER CLEAR, LOAD and RUN the Text Entry program, typing in text until you get a 0/160 report. PEEK up from 17542 to find the top of the C stack. This should be 17551. Correcting this value for the extra 20 bytes we added to the program, the final value for the top of the C stack, is 17531.

12) Substituting in the formula for the minimum address to which we can set RAMTOP in Mode 2 (or 3):

Top of the C stack+Actual RAMTOP-upper limit of Safe Area+36

we get 17618. Set RAMTOP to this value:

```
POKE 16388,210
```

```
POKE 16389,68
```

```
NEW
```

13) LOAD Text Entry program and change the following lines:

```
10 LET A=17619
```

```
90 POKE N,0
```

```
140 PRINT CHR$ PEEK N;
```

14) SAVE and RUN. You can type in 15149 characters that will be stored above RAMTOP (16K). 813 with 2K RAM.

```
5 FAST
10 LET A=17619
20 LET B=INITIAL RAMTOP-1
30 FOR N=A TO B
40 IF PEEK N=227 THEN STOP
50 LPRINT CHR$ PEEK N,
60 NEXT N
```

FIGURE NO. 4

Figure No. 4 is a companion program to be loaded after text entry, to print the text on a printer.

I hope you have enjoyed your Safari in the RAM Jungle as much as I have, being your guide.



# ZX COLOR?

1 EDIT 2 AND 3 THEN 4 TO 5 6 7 8 9 GRAPHICS 0 DELETE

## CHROMA-SOFT

Review by Dick Wagner

CHROMA-SOFT is "Experimental Software Color Graphics" for the T/S 1000/1500 and ZX81 computers.

For those who would like to enlist their computer in some interesting experiments in color illusions, this program offers a rare opportunity to investigate "Subjective Coloring". Bill Russell, developer of the computer concept, has worked out a very interesting program that will produce in a graphic manner the colors: RED, YELLOW, BLUE, CYAN, and GREEN.

The taped program provides an image that does this very thing (for some people). The user can also produce images of choice as Bill provides the parameters for doing this. Granted, there are restrictions as to image drawing in terms of space between different colors. Two methods of drawing are provided. One is to draw the shapes by what amounts to PLOT, as the lines are 1/4 character size. The second method is more complicated as it is more like defining GRAPHIC shapes by using the GRAPHIC keys and character keys, and specifying spaces down and spaces over for the graphics you want. This method permits the use of letter shapes as well as graphic shapes.

There is provision in the program to SAVE graphic shapes, so that further study/demonstration is possible. You can even alter a shape after it is LOADED, thus experiment with different degrees of color separation.

The method developed to give a color effect is to produce each different color by vibrating or pulsing the black image that corresponds to the part of the picture that is assigned that color. This is done, by simply specifying a color for those parts to be so colored. Each color pulses at a different rate that has been determined by tests. The experimenter can vary the black/white flashing rates to study this phenomena.

How well does this illusion work? It is indeed in the eyes of the beholder (or maybe the brain?), as different people see the

"colors" differently. There are factors that influence just how the colors appear, such as viewing distance from the screen, room light brightness (no fluorescent light, the manual says) the viewers physical state, ect. For myself, the pulsing did a bit to my stomach and my wife simply said, "turn it off". At a recent demonstration for our User Group, some half dozen members offered such comments as "couldn't see the colors", "RED was the only color showing", "the colors were not bright or defined", "depends where I stand", "I can see the GREEN", "I can't see the GREEN", ect.

The consensus of viewers was that for some, there was color, but very dim or muddy. The author makes no pretense about this as the system is intended to produce an illusion in the mind that there is color.

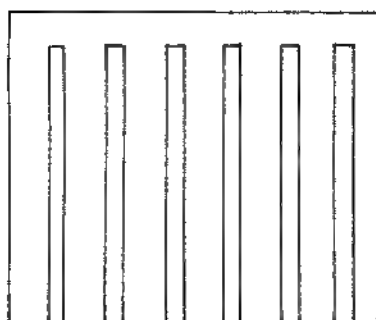
The demonstration image [supplied on the tape], full screen, had me puzzled as to where the green color existed, so I printed the screen for each color on a 2040 printer. The image for each color was then known, so I studied the screen again knowing which lines to look for. I doubt that this convinced me. I haven't yet persued a study to enhance the colors.

This program can provide considerable discussion for groups as it certainly brings up to date a method, first discovered 100 years ago, of stimulating the nervous system with pulsing black and white.

The documentation is very good, written in the Bill Russell "style". Besides a complete instruction of use, he has included an explanation of the BASIC program, and also the machine language with mnemonics and addresses, and a description. This is a treat in itself. There is also provided a cut-out Benham Subjective Color Disk, to try the original experiments. He also provides an amber-colored screen filter (10 x 12 inches) to be taped over the B&W TV screen. Price for the CHROMA-SOFT program on cassette is \$14.95 from Russell Electronics, RD 1, Box 539, Centre Hall, PA 16828.

By Jack Armstrong

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# Technical Applications For T/S Computers

## LINEAR PROGRAMMING

by Dennis Parry

Linear Programming, is the minimization or maximization of a linear form, subject to linear constraints, containing non-negative variables. The program I have written, uses the "simplex" method to do this.

The linear constraints are used to model certain physical situations, and the linear form that is optimized, tells how the situation that has been modeled, reacts to changes in the variables.

The program that I have written finds the minimum of the linear function and the value of the variables used. The array S contains the column numbers of the variables having been solved-for, starting with the first equation and going on down to the last constraint equation. For example:

```

minimize Z= -x3 subject to
x1 +5x3 =1
x2 + x3 =6
-x3 + x4=5
x1≥0, x2≥0, x3≥0, x4≥0

S=(1,2,4) since x1= 1-5x3
x2= 6-x3
x4= 5+ x3

```

consider the example:

```

minimize Z=-x1
x1 + x2 =5
2x1 +x3=1
x1≥0, x2≥0, x3≥0

```

In the computer program the constant in the function Z (i.e.; D) is zero.

The array C= (-1,0,0) since the coefficients of x3 and x2 must be zero in the algorithm.

The array S= (2,3)

The array A=  $\begin{pmatrix} 1 & 1 & 0 \\ 2 & 0 & 1 \end{pmatrix}$

The array E= (5,1)

The array B=  $\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$  initially

The array F is used to transform the array B in each cycle of the algorithm. Note: The coefficients of the basic variables in Z must be made zero.

Here is a problem that is solvable by Linear Programming: A company makes wooden dowels. They make three sizes; 1/4", 1/2", and 3/4" in diameter, with a fixed length of three feet. They sell for one, two and three dollars per dozen respectively. Fifty of 1/4 and 3/4 inch dowels, together can be made from one piece of wood (if the wood is good). Seventy-five of the 1/4 and 1/2-inch dowels can be made if the wood is good.

To conserve wood, two 1/4-inch dowels are made after each 3/4-inch dowel is made. How many of each size dowel, should be made to maximize profit, from each piece of wood? maximize

```

Z= $1.00 x1 + $2.00 x2 + $3.00 x3 subject to
2 x1 + + 1 x3 ≤ 50
1 x1 + 1 x2 ≤ 75
x1≥0, x2≥0, x3≥0, x4≥0, x5≥0

```

To minimize Z, we take the negative of -Z, i.e.; -(-Z). The answer: x3=50, x2=75, z= \$300.00, x1=x4=x5=0

where x1= the number of 1/4" dowels made  
x2= the number of 1/2" dowels made  
x3= the number of 3/4" dowels made

To put the problem in a form the computer can use, we need to add slack variables x4, and x5 where both x4≥0 and x5≥0. then the problem is:

```

maximize
Z= $1.00 x1 + $2.00 x2 + $3.00 x3
2 x1 + + x3 + x4 + 0 x5 =50
x1 + x2 + 0x4 + x5 =75
xi≥0 (i= 1,2,3,4,5)

```

and we find (- minimum (-Z)).

A good reference [for further information]: "LINEAR OPTIMIZATION" by Spivey, W. Allen, and Thrall, Robert M., Copyright 1970 by Holt, Rinehart and Winston, Inc.



This program will run on the  
Timex/Sinclair 2068

```

1000 REM BR 3-8-84 SIMPLEX
1010 REM THE PROGRAM SOLVES A
1020 REM LINEAR PROGRAMMING
1030 REM PROBLEM IN CANONICAL
1040 REM FORM
1050 REM
1060 NEW C SUB 1000
1070 NEW A SUB 1000
1080 NEW B SUB 1000
1090 NEW K SUB 1000
1100 NEW M SUB 1000
1110 NEW N SUB 1000
1120 NEW P SUB 1000
1130 NEW Q SUB 1000
1140 NEW R SUB 1000
1150 NEW S SUB 1000
1160 NEW T SUB 1000
1170 NEW U SUB 1000
1180 NEW V SUB 1000
1190 NEW W SUB 1000
1200 NEW X SUB 1000
1210 NEW Y SUB 1000
1220 NEW Z SUB 1000
1230 NEW AA SUB 1000
1240 NEW AB SUB 1000
1250 NEW AC SUB 1000
1260 NEW AD SUB 1000
1270 NEW AE SUB 1000
1280 NEW AF SUB 1000
1290 NEW AG SUB 1000
1300 NEW AH SUB 1000
1310 NEW AI SUB 1000
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1340 NEW AL SUB 1000
1350 NEW AM SUB 1000
1360 NEW AN SUB 1000
1370 NEW AO SUB 1000
1380 NEW AP SUB 1000
1390 NEW AQ SUB 1000
1400 NEW AR SUB 1000
1410 NEW AS SUB 1000
1420 NEW AT SUB 1000
1430 NEW AU SUB 1000
1440 NEW AV SUB 1000
1450 NEW AW SUB 1000
1460 NEW AX SUB 1000
1470 NEW AY SUB 1000
1480 NEW AZ SUB 1000
1490 NEW BA SUB 1000
1500 NEW BB SUB 1000
1510 NEW BC SUB 1000
1520 NEW BD SUB 1000
1530 NEW BE SUB 1000
1540 NEW BF SUB 1000
1550 NEW BG SUB 1000
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1610 NEW BM SUB 1000
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1670 NEW BS SUB 1000
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1710 NEW BW SUB 1000
1720 NEW BX SUB 1000
1730 NEW BY SUB 1000
1740 NEW BZ SUB 1000
1750 NEW CA SUB 1000
1760 NEW CB SUB 1000
1770 NEW CC SUB 1000
1780 NEW CD SUB 1000
1790 NEW CE SUB 1000
1800 NEW CF SUB 1000
1810 NEW CG SUB 1000
1820 NEW CH SUB 1000
1830 NEW CI SUB 1000
1840 NEW CJ SUB 1000
1850 NEW CK SUB 1000
1860 NEW CL SUB 1000
1870 NEW CM SUB 1000
1880 NEW CN SUB 1000
1890 NEW CO SUB 1000
1900 NEW CP SUB 1000
1910 NEW CQ SUB 1000
1920 NEW CR SUB 1000
1930 NEW CS SUB 1000
1940 NEW CT SUB 1000
1950 NEW CU SUB 1000
1960 NEW CV SUB 1000
1970 NEW CW SUB 1000
1980 NEW CX SUB 1000
1990 NEW CY SUB 1000
2000 NEW CZ SUB 1000
2010 NEW DA SUB 1000
2020 NEW DB SUB 1000
2030 NEW DC SUB 1000
2040 NEW DD SUB 1000
2050 NEW DE SUB 1000
2060 NEW DF SUB 1000
2070 NEW DG SUB 1000
2080 NEW DH SUB 1000
2090 NEW DI SUB 1000
2100 NEW DJ SUB 1000
2110 NEW DK SUB 1000
2120 NEW DL SUB 1000
2130 NEW DM SUB 1000
2140 NEW DN SUB 1000
2150 NEW DO SUB 1000
2160 NEW DP SUB 1000
2170 NEW DQ SUB 1000
2180 NEW DR SUB 1000
2190 NEW DS SUB 1000
2200 NEW DT SUB 1000
2210 NEW DU SUB 1000
2220 NEW DV SUB 1000
2230 NEW DW SUB 1000
2240 NEW DX SUB 1000
2250 NEW DY SUB 1000
2260 NEW DZ SUB 1000
2270 NEW EA SUB 1000
2280 NEW EB SUB 1000
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2300 NEW ED SUB 1000
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3110 NEW HH SUB 1000
3120 NEW HI SUB 1000
3130 NEW HJ SUB 1000
3140 NEW HK SUB 1000
3150 NEW HL SUB 1000
3160 NEW HM SUB 1000
3170 NEW HN SUB 1000
3180 NEW HO SUB 1000
3190 NEW HP SUB 1000
3200 NEW HQ SUB 1000
3210 NEW HR SUB 1000
3220 NEW HS SUB 1000
3230 NEW HT SUB 1000
3240 NEW HU SUB 1000
3250 NEW HV SUB 1000
3260 NEW HW SUB 1000
3270 NEW HX SUB 1000
3280 NEW HY SUB 1000
3290 NEW HZ SUB 1000
3300 NEW IA SUB 1000
3310 NEW IB SUB 1000
3320 NEW IC SUB 1000
3330 NEW ID SUB 1000
3340 NEW IE SUB 1000
3350 NEW IF SUB 1000
3360 NEW IG SUB 1000
3370 NEW IH SUB 1000
3380 NEW II SUB 1000
3390 NEW IJ SUB 1000
3400 NEW IK SUB 1000
3410 NEW IL SUB 1000
3420 NEW IM SUB 1000
3430 NEW IN SUB 1000
3440 NEW IO SUB 1000
3450 NEW IP SUB 1000
3460 NEW IQ SUB 1000
3470 NEW IR SUB 1000
3480 NEW IS SUB 1000
3490 NEW IT SUB 1000
3500 NEW IU SUB 1000
3510 NEW IV SUB 1000
3520 NEW IW SUB 1000
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3560 NEW JA SUB 1000
3570 NEW JB SUB 1000
3580 NEW JC SUB 1000
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3830 NEW KB SUB 1000
3840 NEW KC SUB 1000
3850 NEW KD SUB 1000
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4000 NEW KS SUB 1000
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4110 NEW LD SUB 1000
4120 NEW LE SUB 1000
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4140 NEW LG SUB 1000
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4770 NEW NT SUB 1000
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4870 NEW OD SUB 1000
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4980 NEW OO SUB 1000
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5620 NEW RA SUB 1000
5630 NEW RB SUB 1000
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5660 NEW RE SUB 1000
5670 NEW RF SUB 1000
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5690 NEW RH SUB 1000
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5760 NEW RO SUB 1000
5770 NEW RP SUB 1000
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5790 NEW RR SUB 1000
5800 NEW RS SUB 1000
5810 NEW RT SUB 1000
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5830 NEW RV SUB 1000
5840 NEW RW SUB 1000
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5880 NEW SA SUB 1000
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5960 NEW SI SUB 1000
5970 NEW SJ SUB 1000
5980 NEW SK SUB 1000
5990 NEW SL SUB 1000
6000 NEW SM SUB 1000
6010 NEW SN SUB 1000
6020 NEW SO SUB 1000
6030 NEW SP SUB 1000
6040 NEW SQ SUB 1000
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6060 NEW SS SUB 1000
6070 NEW ST SUB 1000
6080 NEW SU SUB 1000
6090 NEW SV SUB 1000
6100 NEW SW SUB 1000
6110 NEW SX SUB 1000
6120 NEW SY SUB 1000
6130 NEW SZ SUB 1000
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6160 NEW TC SUB 1000
6170 NEW TD SUB 1000
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6190 NEW TF SUB 1000
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6210 NEW TH SUB 1000
6220 NEW TI SUB 1000
6230 NEW TJ SUB 1000
6240 NEW TK SUB 1000
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6420 NEW UD SUB 1000
6430 NEW UE SUB 1000
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6450 NEW UG SUB 1000
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7860 NEW ZV SUB 1000
7870 NEW ZW SUB 1000
7880 NEW ZX SUB 1000
7890 NEW ZY SUB 1000
7900 NEW ZZ SUB 1000

```

```

1520 REM
1530 FOR I=0 TO 5
1540 IF I=H+G THEN GO TO 15
1550
1560 FOR J=0 TO 5
1570 LET B(I,J)=B(I,J)+F
1580 NEXT J
1590 NEXT I
1600 REM
1610 LET I=T LET B(H+G,I)=B(H+G,I)+C
1620 IF I=0 THEN RETURN
1630 LET B(H+G,I)=B(H+G,I)+C
1640 LET I=I+G GO TO 1620
1650 REM
1660 REM MULTIPLY E(*), BY F/*
1670 LET X=F H+G+E(I)
1680 REM
1690 FOR I=T TO 5
1700 IF H=I-0 THEN GO TO 171
1710 LET E(I-0)=E(I-0)+F*I*
1720 NEXT I
1730 LET E(H)=X RETURN REM
1740 REM PRINT OPTIMAL VALUE AND
1750 OPTIMAL PROGRAM
1760 CLS
1770 PRINT "THE OPTIMAL PROGRAM IS"
1780 REM PRINT OPTIMAL PROGRAM
1790 FOR I=0 TO P
1800 LET D=D-C(I)*E(I)
1810 PRINT "X",S(I),"=",E(I)
1820 NEXT I
1830 PRINT "WHERE Z=",D REM
1840 PRINT V$ STOP REM
1850 REM
1860 LET Z=P-I-P
1870 LET X=Z
1880 LET Q=P-I/P
1890 LET T=0+0
1900 LET A$=" INPUT THE NUMBER O
1910 F VARIABLES " IN THE PROBLEM"
1920 LET U$=" THE OPTIMAL PROGRAM IS"
1930 LET V$=" WHERE THE OTHER VAR
1940 IABLES EQUAL ZERO."
1950 LET B$=" INPUT THE NUMBER O
1960 F CONSTRAINTS"
1970 LET C$=" THE COEFFICIENT OF
1980 X I IN EQUATION J IS"
1990 LET D$=" THE CONSTANT IN THE
2000 OBJECTIVE FUNCTION IS"
2010 LET E$=" INPUT THE BASIC SE
2020 QUENCE"
2030 LET F$=" INPUT THE CONSTRAI
2040 NT CONSTANTS"
2050 LET G$=" INPUT THE COEFFICI
2060 ENTS IN THE OBJECTIVE FUNCTION"
2070 REM ARRAY C CONTAINS COST
2080 COEFFICIENTS
2090 LET H$=" THE OBJECTIVE FUNCT
2100 ION IS UNBOUNDED"
2110 REM ARRAY A CONTAINS
2120 INITIAL TABLEAU
2130 REM ARRAY B CONTAINS
2140 INVERSE OF BASIS

```

```

7140 REM Z=0 IS THE VALUE OF THE
7150 OBJECTIVE FUNCTION
7160 REM ARRAY E CONTAINS
7170 CONSTRAINT CONSTANTS
7180 REM ROW H IS THE PILOT ROW
7190 REM COLUMN K IS PILOT
7200 COLUMN
7210 REM ARRAY T CONTAINS COLUMN
7220 K OF A
7230 LET Y$=" THE C(S(I)), MUST B
7240 E ZERO."
7250 REM ARRAY F IS PILOT MATRIX
7260 REM ARRAY A HAS P ROWS AND
7270 N COLUMNS
7280 REM
7290 PRINT A$
7300 INPUT N CLS
7310 PRINT B$ INPUT P LET G=
7320 P+0 CLS
7330 DIM S P DIM B S S
7340 DIM C N DIM E(P) DIM F
7350 PRINT C$ REM
7360 FOR I=0 TO N
7370 FOR J=0 TO P
7380 PRINT AT 2.20 I AT
7390 0.12 J
7400 INPUT A(I,J)
7410 NEXT J
7420 NEXT I
7430 CLS REM
7440 FOR I=0 TO S
7450 LET B(I,I)=0
7460 NEXT I
7470 PRINT "PRESS ANY KEY TO CON
7480 TINUE."
7490 PAUSE Z
7500 CLS
7510 PRINT F$ PRINT REM
7520 FOR I=0 TO P
7530 INPUT E(I)
7540 PRINT "E(I)=",E(I)
7550 NEXT I
7560 PRINT "PRESS ANY KEY TO CON
7570 TINUE." REM
7580 PAUSE Z
7590 CLS
7600 PRINT G$ PRINT REM
7610 FOR I=0 TO N
7620 INPUT C(I)
7630 PRINT "C(I)=",C(I)
7640 NEXT I
7650 FOR I=1 TO P
7660 IF C(S(I))<Z THEN PRIN
7670 T Y$ STOP
7680 NEXT I
7690 REM
7700 PRINT "PRESS AN. KEY TO CON
7710 TINUE."
7720 PAUSE Z
7730 CLS
7740 PRINT D$ PRINT
7750 INPUT D PRINT TAB 15, D
7760 PRINT "PRESS ANY KEY TO CONTI
7770 NUE." PAUSE Z LET D=D CLS
7780 RETURN

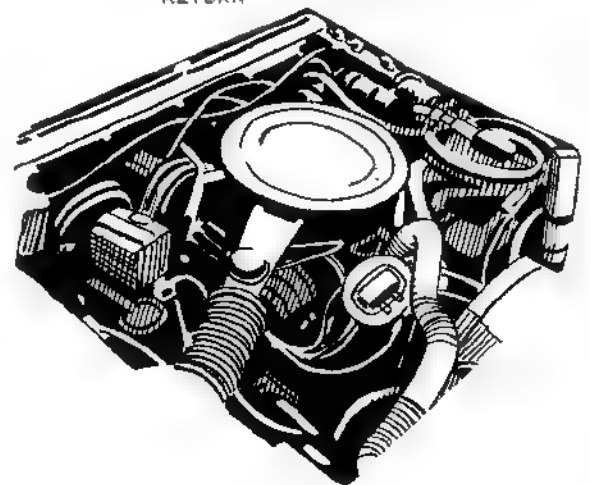
```

## TURBOS

by Rick Borland

"TURBOS" is a computer program that I wrote for engine building enthusiasts. I will try to explain how it works and what it does.

By taking an engine that has no turbo, blower, ect., and using it's rated horsepower, the rpm's it was rated at, and the engine's cubic inch displacement, one can figure the cubic feet of air flow through the engine and thus calculate new horsepower



ratings and cfm rates at different turbo boost pressures. Most "outright" sold turbo systems have 6 to 15 psi boost. Racing and pulling engines have higher boosts. But anyway you look at it, heat is generated when air is compressed, thus creating new problems at higher boost figures. Cooling the incoming turbo-compressed air, helps to increase power at lower temperatures. This method is called "intercooling", and can be done in the outside air, or through the engine's cooling system (thermostat temperature). At low boosts, intercooling is not helpful, but actually hinders results. But calculated results are interesting. Actual engine results will be slightly less due to friction.

Use the program as follows. Input all figures asked for, keeping in mind that outdoor ambient temperature ratings are almost always 70°F or 80°F when calculating engine figures. Engines rated in size by "cc", can be converted (1 liter = 1000cc = approx. 61 cubic inches).

When entering cooling modes, air to air will be outdoor temperature in "F°", and air to water will be the engine's thermostat setting "F°". The program rounds out all calculations to the nearest hundreth.

All calculations in the program, as far as temperature go, are figured in "absolute temperature". Everything else in the program comes from physics of turbos, derived from formulas used by tractor manufacturers, but works well for almost all calculations of engines. The program prints out on a standard Timex 2040 (or comparable) printer.

Any questions? Please direct them to me and I'll answer them as best as I can.

This program will run on the T/S 2068

```

5 REM SAVE TURBOS LINE 0
DEF FN X A=INT (.005*A)+.1
10 PRINT "THIS PROGRAM FIGURES
TURBOCHARGING A NORMAL
ASPIRATED ENGINE. IT TAKES
INTO CONSIDERATION THAT P
REC IS 65% EFFICIENT AND INT
ERCOOLING IS 70% EFFICIENT."
15 PRINT "PRINT 'HIT' ENTER:
TO CONTINUE."
20 PAUSE 0
30 INPUT "DISPLACEMENT OF ENGI
NE 'CU IN.' " C IN
40 INPUT "RATED HORSEPOWER "
P
50 INPUT "RM HORSEPOWER WAS R
ATED AT? " RPM
70 INPUT "OUTDOOR AMBIENT TEM
PERATURE? " T1 TEMP
75 INPUT "AMOUNT OF BOOST OF
TURBO? (PSI) " BOOST
80 LET CFM=.65*(C IN*RPM)/(2+17
281)
90 LET P1=14.7
100 LET P2=BOOST+14.7
110 LET T2=TEMP+460
120 LET T2=T1+ P2/P1+.283
130 LET TEMPRISE=(T2-T1) .65
140 LET TEMPOT=TEMPRISE+TEMP
150 LET DENRATIO=(T1/T2)+P2 P1

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160 INPUT "ENGINE DISPLACEMENT "
C IN
170 INPUT "RATED HP " HP
180 INPUT "AIR TEMP. ENGINE
IN 'C (F) " C IN
190 LET TEMPOT=TEMPOT
200 LET BOOST=BOOST
210 LET TEMPOT=TEMPOT
220 LET TEMPOT=TEMPOT
230 LET CFM=CFM
240 LET HP=HP
250 LET DENRATIO=FN X DENRATIO
260 LET PRINT
270 LET CHECK ON C
280 IF C=1 THEN CLS 60 3.5
290 IF C=2 THEN CLS 60 3.5
300 IF C=3 THEN CLS 60 3.5
310 IF C=4 THEN CLS 60 3.5
320 IF C=5 THEN CLS 60 3.5
330 IF C=6 THEN CLS 60 3.5
340 IF C=7 THEN CLS 60 3.5
350 IF C=8 THEN CLS 60 3.5
360 IF C=9 THEN CLS 60 3.5
370 IF C=10 THEN CLS 60 3.5
380 IF C=11 THEN CLS 60 3.5
390 IF C=12 THEN CLS 60 3.5
400 IF C=13 THEN CLS 60 3.5
410 IF C=14 THEN CLS 60 3.5
420 IF C=15 THEN CLS 60 3.5
430 IF C=16 THEN CLS 60 3.5
440 IF C=17 THEN CLS 60 3.5
450 IF C=18 THEN CLS 60 3.5
460 IF C=19 THEN CLS 60 3.5
470 IF C=20 THEN CLS 60 3.5
480 IF C=21 THEN CLS 60 3.5
490 IF C=22 THEN CLS 60 3.5
500 IF C=23 THEN CLS 60 3.5
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770 IF C=50 THEN CLS 60 3.5
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850 IF C=58 THEN CLS 60 3.5
860 IF C=59 THEN CLS 60 3.5
870 IF C=60 THEN CLS 60 3.5
880 IF C=61 THEN CLS 60 3.5
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5520 IF C=525 THEN CLS 60 3.5
5530 IF C=526 THEN CLS 60 3.5
5540 IF C=527 THEN CLS 60 3.5
5550 IF C=528 THEN CLS 60 3.5
5560 IF C=529 THEN CLS 60 3.5
5570 IF C=530 THEN CLS 60 3.5
5580 IF C=531 THEN CLS 60 3.5
5590 IF C=532 THEN CLS 60 3.5
5600 IF C=533 THEN CLS 60 3.5
5610 IF C=534 THEN CLS 60 3.5
5620 IF C=535 THEN CLS 60 3.5
5630 IF C=536 THEN CLS 60 3.5
5640 IF C=537 THEN CLS 60 3.5
5650 IF C=538 THEN CLS 60 3.5
5660 IF C=539 THEN CLS 60 3.5
5670 IF C=540 THEN CLS 60 3.5
5680 IF C=541 THEN CLS 60 3.5
5690 IF C=542 THEN CLS 60 3.5
5700 IF C=543 THEN CLS 60 3.5
5710 IF C=544 THEN CLS 60 3.5
5720 IF C=545 THEN CLS 60 3.5
5730 IF C=546 THEN CLS 60 3.5
5740 IF C=547 THEN CLS 
```

# A Mickey Mouse Solution To A Graphic Problem

by Duncan Teague

Attention users of the ZEBRA GRAPHICS TABLET. Are you tired of having the cursor "spray" all over your screen when you use the Zebra Painter software? Are you carving little grooves into the surface of the Koala Pad in an attempt to keep stray marks from appearing in your graphic creations? Would you like to be able to hold that cursor still? Want to use a MOUSE with TECH-DRAW, the program that emulates Apple's Mouse-paint?

Well you can! Next time you visit your local Radio Shack to pick up a couple of rolls of thermal paper for your ZX or 2040 printer, take a look at their TRS-80 COLOR MOUSE. You'll notice that the little plug at the end of the Mouse cable looks a lot like the socket in the Zebra Graphics Tablet interface. The only thing missing is the center pin. Is the little light bulb appearing in the balloon above your head?

The Color Mouse will work just fine once the software is initialized. Load your Tech Draw software, for example, and activate the program by pressing the "Command" button on the Koala Pad. Then carefully extract the graphics tablet's plug from the interface socket. Plug in the Color Mouse cable. Enjoy!

The Color Mouse will allow a degree of control over the cursor unobtainable with the stylus and graphics tablet. If you release the Color Mouse, the cursor just sits there and blinks. If you move the Color Mouse over the table or desk top, the cursor follows its movement. When you press the button on the Color Mouse, menu selections can be made, and drawing is accomplished with incredible ease.

The Color Mouse will not give you more artistic talent than you already possess. But it will allow you to produce graphics in far less time because of the stability of the cursor. The Color Mouse is Catalog No. 26-3025, and it costs \$49.95 at your local Radio Shack.

[Editor- Zebra Systems will sell the TECH DRAW software and the Graphics Tablet's interface (excluding the Kola Pad) separately if a user wanted to adapt the Color Mouse. Write or call for further information and prices: 78-06 Jamaica Ave., Woodhaven, NY 11421, (718) 296-2385]



Radio Shack's Color Mouse



## LOLLIPOPS

by  
Warren Fricke

### Author's Program Notes:

"LOLLIPOPS was intended for the younger generation. Of course, we grown-ups can enjoy it too as the game is both addictive and challenging. This program is arranged to allow a player to use either the keyboard or a conventional joystick to control direction. The latter works well on this program as only two directions are involved, up and down. LOLLIPOPS contains its own set of instructions on how to play the game."

5 REM \*\* LOLLIPOPS \*\*  
by  
Warren Fricke

```
6
7
10 GO SUB 300
20 RANDOMIZE GO TO 420
30 BORDER 6 PAPER 7 CLS
35 FOR N=1 TO 10 PRINT BRIGHT
1 PAPER " AT 19*RN+1,15*RN+8
" NEXT N
40 FOR N=1 TO 75
50 PRINT PAPER 6-INT (7*RN*RN
) AT 19*RN+1,29*RN+1,
60 NEXT N
70 LET L=11 LET C=A LET K=1
80 LET P=0 LET S=0 LET T=0
90 LET LL=L LET CC=C
95 POKE 23658,8
100 IF C<1 OR C>28 THEN LET K=-
K
105 LET S$=INKEY$ LET ST=STIC
K,1,1
110 LET L=L+((S$="Z" OR ST=2) A
ND L-20)-((S$="0" OR ST=1) AND L
>11)
120 LET C=C+K
130 LET A=ATN (L/((C+2) AND K=
1)+10 AND K=-1)/8
140 IF A=.5 THEN BEEP .05,25 L
ET P=P+1 LET S=S+(7-A)+2
145 IF A=15 THEN BEEP .5,-35 0
TO 200
150 PRINT PAPER 7,AT L,C, ("--O"
AND K=1)+("O--" AND K=-1)
160 PAUSE 5
170 PRINT PAPER 7,AT LL,CC
180 LET T=T+1 IF T=300 THEN G
O TO 200
```

```
180 GO TO 50
200 PRINT FLASH 1,AT 0,9," GAME
IS OVER " PAUSE 120
210 PRINT AT 0,2,"Press C-KEY,
or FIRE BUTTON, to play
again."
220 PRINT AT 21,0,"YOU GOT ' P
" POPS " AT 21,20 "Score = " S
230 IF STICK (2,1)=1 OR INKEY$=
"C" THEN GO TO 30
240 GO TO 230
300 PRINT FLASH 1,AT 0,7," ** L
OLLIPOPS ** RETURN
420 PRINT AT 2,0,"YOUR LOLLIPOP
SWEEPS LEFT AND RIGHT, BACK A
ND FORTH ABOUT 10 TIMES, THRU A
FIELD OF ASSORTED FLAVORS."
430 PRINT "THE D AND Z KEYS CO
NTROL THE UP AND DOWN POSITION O
F THE LOLLIPOP. YOU MAY ALSO
USE A JOY STICK PLUGGED INTO
THE PORT ON YOUR LEFT."
440 PRINT "YOU GET CREDIT FOR
EACH FLAVOR YOU TRY, BUT THE SC
ORE DEPENDS UPON THE FLAVOR ITS
ELF."
450 PRINT "PRESS ". FLASH 1,
ENTER " FLASH 0," TO CONTINUE."
460 INPUT Z$ CLS
470 GO SUB 300
480 PRINT AT 2,0,"THE HIGHEST S
Coring IS LICORICE AND THEY ARE
IN THIS ORDER "
490 PRINT AT 9,9, LICORICE...49
" TAB 9, GRAPE.....35, TAB 9 C
HERRY.....25, TAB 9, STRAWBERRY.
16, TAB 9, LIME.....9, TAB 9,
PISTACHIO...4, TAB 9, LEMON....
...1"
```





## AERCO USERS COLUMN

by  
Dennis  
Jurries

There has been no EPROM updates in the last two months, so I will give the conversion changes for TASWORD II, and PRO/FILE. In the next issue I will give a conversion command table comparing the commands for the AERCO, RAMEX, and the ZEBRA disc systems.

The following are the changes you can make to convert TASWORD to the AERCO disc system. These changes do not include any wording changes that you may want to make, to have Tasword refer to disc rather than tape.

```
Line - 15:5 CAT "tasword.BIN",
       700:4 MOVE "tasword.BAS",15
       710 MOVE "tasword.BIN",54784,10751
       1030:3 LET A$=A$+".BIN","", "+ STR$ b+", "+ STR$ a:MOVE"A$
       2030:2 LET A$=A$+".BIN","", CAT "A$",
```

After trying for two weeks to convert PRO/FILE 2068 so that the files may be saved separately from the program...I gave up. I tried to use both an early and a later version of the program. This is an excellent data base program, and really needs to have one more rewrite to be fully useful. It may be possible to save the files by re-saving the complete program every time you add to or start a new file. But you would have to be extremely careful to keep separate discs for different files.

One further bit of information. Be extremely careful about formatting discs with a program in the computer, and also using the erase option. This can cause the disc to crash and the loss of all information on that disc.

## GAMESMATE FIX

by Steve Wyatt

Those who have purchased the GAMESMATE Kempston compatible joystick interface may have noticed conflicts with other add-ons such as the AERCO disk interface. This is due to the minimal decoding techniques used by so many of the third party peripherals, including the GAMESMATE, for the Spectrum and 2068. Further decoding can be accomplished relatively simply and without additional parts, that will resolve most of these conflicts. Understanding the circuit isn't necessary, so if you wish, refer to FIGURE 1 and make the changes.

Essentially, two more address lines, A6 and A7, are being brought into play. Originally, if I/Oreq was low(active) and A5 was low(inactive), the joystick would be enabled. Thus the GAMESMATE I/F would be active every time an I/O operation was performed and A5 wasn't used. By bringing A6 and A7 into play, we can effectively restrict the joystick to an I/O address of 31 decimal/I/F hex and below. The first move is to cut the trace (marked with the X) running from pin 6 of the LS32 to pin 1 of the LS244. A6 and A7, marked A and B at the finger connectors, are jumpered to pins 1 and 2 of the LS32, and the output is then respectively taken from pin 3 and jumpered to pin 10 of the same chip. Pin 6 is jumpered to pin 9, again, on the same chip.

Finally we can take our new enable signal to the LS244 by jumpering pin 8 of the LS32 to pin 1 of the LS244.

This fix doesn't work on the Zebra Graphics Tablet, which is mapped in at 0-16. Your questions and problems can be directed to Steve Wyatt (301) 779-7743. I would like to know if this fix works with the A & J Mikrodrives.

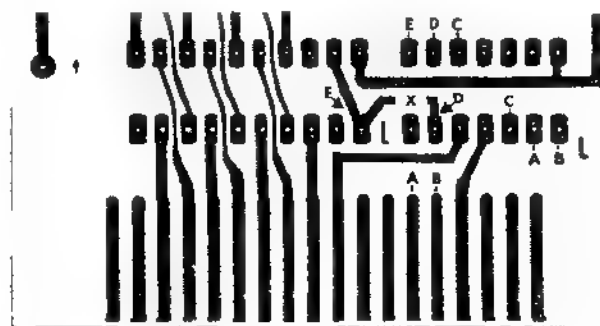


Figure 1 - Place the GAMESMATE solder-side up (the chips and connector toward the table) with the connector fingers toward you, and compare the lower right portion of the board with figure 1. Cut the trace marked with an X in the diagram, and make the five jumpers using thin wirewrap wire connecting A to A, B to B, C to C, D to D and E to E. Clean the residue from the board with nail polish remover, check your connections and you're done. You can use epoxy or glue to make sure the jumper wires remain flush on the board.

# JOYSTICK WRAP AROUND

by Martin DeBoniface



The following BASIC joystick program for the T/S 2068 computer is an enhancement to an original by Warren Fricke, first published in TIME DESIGNS Sept/Oct 1985 (Vol.1, No.6).

Keeping the flavor of it's predecessor, this program does no more than demonstrate it's new potential. Possible applications will be dealt with later.

There are two lines of code which make this program tick. All else is superfluous. These two lines are the assignment statements for "column" c and "line" l (Stmt #360 and 370).

These two assignment statements effectively replace over three dozen IF statements. It reminds me of APL, where the epitomy of programming code is; "See if you can cram it all in one line". This architectural marvel is made possible by what is known as "BOOLEAN LOGIC AND RELATIONAL OPERATORS".

Boolean Logic, also known as Boolean Arithmetic, is named after George Boole, a 19th century English mathematician and logician. Relational operators are also known as Binary operators. The T/S 2068 user's manual outlines these very briefly on page 228.

HOW IT WORKS: In a nutshell, all I have done is include the statement (-x OR ...) twice, within each assignment statement for l and c in the original BASIC joystick routine (see TABLE 1).

-x is the parameter limit for each axis -31 for horizontal, and -21 vertical. Sinclair BASIC only allows 0 to 31 characters horizontally and 0 to 21 characters vertically.

The inclusion of this bit of code, as in the antecedant program, not only checks for range limitations (eg.<0), but acts on them as well. Should the joystick direct the cursor beyond the screen range, the limit is reassigned to it's opposite value.

What does this mean? If you try to go beyond column zero, the cursor is reassigned to the opposite side of the screen and pops up in column 31. Or, if you pass through the right side of the screen, the cursor "wraps

around" the screen and appears on the left. The same with top and bottom. That is why its called a WRAP AROUND screen.

What can you do with this you ask? The possibilities are endless. Everything from mouse controlled icons, to word processing aids (not the disease), to games, games and more games.

I have deliberately excluded any form of PAUSE statements, mainly because the faster the better. After all, you can only go so fast in BASIC. Finally, if you can appreciate BASIC, with all it's limitations, then enjoy the following: All-purpose Symbolic Instructional Code.

300 REM JOY STICK WrapAr 1.0 K  
© Martin DeBoniface 30/09/85

```
310 LET c=0: LET l=0
320 PRINT AT (l,c,"#")
330 LET cc=c: LET ll=l
340 LET s= STICK (1,2)
350 LET b= STICK (2,2)
360 LET c=c+(1-31 OR c<31) AND
(s=8 OR s=9 OR s=10)-(1-31
OR c>0) AND (s=4 OR s=5 OR
s=6))
370 LET l=-1+(1-21 OR l<21) AND
(s=2 OR s=6 OR s=10)-(1-21
OR l>0) AND (s=1 OR s=5 OR
s=9))
380 PRINT AT 0,0,"FIRE" AND b=1
390 PRINT AT (l,cc,"")
AND ((l<>l OR cc<>c))
400 GO TO 320
410 SAVE "Joy STICK WrapAr"
PRINT #0;AT 0,6;"ReWind"
"Tap TO VERIFY": VERIFY
420 STOP
430 REM
```

## INDEX

### Meaningful Variable Names

c	= column	(0 - 31)
l	= line	(0 - 21)
cc	= concurrent c value	
ll	= last l value	
s	= stick value	
b	= button value	(FIRE)

440 REM

## TABLE 1

```
LET c=c+(1-31 OR c<31) AND
(s=8 OR s=9 OR s=10)-(1-31
OR c>0) AND (s=4 OR s=5 OR
s=6))
```

```
LET l=-1+(1-21 OR l<21) AND
(s=2 OR s=6 OR s=10)-(1-21
OR l>0) AND (s=1 OR s=5 OR
s=9))
```

## LABELMAKER

by Bill Ferrebee  
MOUNTAINEER SOFTWARE

I have been one of those "Sinclair Junkies" since almost the beginning. Yes... I took the abuse..."You have one of those toys?!?"..."I thought that was a high-tech doorstep!"...and so on. But, you know as well as I do that you wouldn't trade in your T/S for anything. Our motley crew of tinkers constantly come up with new and exciting ways to enjoy or "toys". And with great publications such as this, we never run out of places to share our newfound knowledge, or gain insight on how to even better use "the power within our reach".

With this in mind, I would like to give a gift to you, "the believers". LabelMaker is a short program that I wrote to

fulfill a need I had for a way to make nice looking cassette labels for my software collection. LabelMaker will work with any full-size printer interface you may have (AERCO, Tasman, A&J, Oliger) because you will use the print driver software provided with your interface, to drive this program.

First, load the driver software for your interface, and save it to a blank tape. DO NOT REWIND THE TAPE! Next, type in the simple program below. SAVE this on the tape immediately following the driver. Make sure to use the LINE command on the SAVE so that it will auto-run.

That's all there is to it! Just one note...If you plan on using double quotes ("), such as LOAD "", you will need to input TWICE the amount you will want printed. LOAD "" will need to be inputted as LOAD "" "".

I have found a great place to buy form feed cassette labels to use with your full-size printer. CUSTOM TAPE LOADERS (8135 Cox's Dr., Suite 209 Portage, MI 49081) has them available in four colors (white-blue-red-yellow) for \$1.60 per 1000. Check out their prices on blank computer tapes, too.

I hope you get as much out of this program as I did. Let me know if you make any modifications to this program. Bill Ferrebee, MOUNTAINEER SOFTWARE, 749 Hill Street #6, Parkersburg, WV 26104.

```
This program runs on the T/S 2068
10 CLS : INPUT "Program Title:";a$
12 IF LEN a$>32 THEN GO TO 10
14 PRINT TAB 16-(LEN a$/2);a$
20 INPUT "Line #2 Info:";b$
22 IF LEN b$>32 THEN GO TO 20
24 PRINT TAB 16-(LEN b$/2);b$
30 INPUT "Line #3 Info:";c$
32 IF LEN c$>32 THEN GO TO 30
34 PRINT TAB 16-(LEN c$/2);c$
38 PRINT : PRINT : PRINT : PRINT
40 INPUT "Bottom Line:";d$
42 IF LEN d$>32 THEN GO TO 40
44 PRINT TAB 16-(LEN d$/2);d$
50 PRINT AT 21,B; FLASH 1;"Correct? (y/n)"
52 IF INKEY$="" THEN GO TO 52
54 IF INKEY$="n" THEN GO TO 10
100 PRINT AT 21,B;" " : INPUT "Number of copies :";x
110 FOR i=1 TO x
120 LPRINT TAB 16-(LEN a$/2);a$
122 LPRINT TAB 16-(LEN b$/2);b$
124 LPRINT TAB 16-(LEN c$/2);c$
126 LPRINT : LPRINT : LPRINT : LPRINT : LPRINT
128 LPRINT TAB 16-(LEN d$/2);d$
130 LPRINT : LPRINT
132 NEXT i
140 INPUT "More? (y/n)";x$
142 IF x$="y" THEN GO TO 100
150 INPUT "Another title? (y/n)";x$
152 IF x$="y" THEN GO TO 10
160 CLS : PRINT AT 10,B;"[Work Complete]"; STOP
```



## THE PORTUGUESE CONNECTION

by John W. Gaddis

Hi and welcome to the first of what I hope to be many columns in TIME DESIGNS on the 3 inch Floppy Disk Drive System from Portugal, that is being sold by Zebra Systems. I hope that the Holidays were good to you. Maybe some of you received the Zebra Disk Drive System for a Christmas gift, and are looking into tapping the full power of this system. It will be my goal to help you use this system to its full capacity.

As the next few months go by, we will be going over how to use the "Tree Structure" operating system of the drives, to develop many directories and related files on one disk. We will also be going into depth on the two file systems supported by these drives...random access and sequential files.

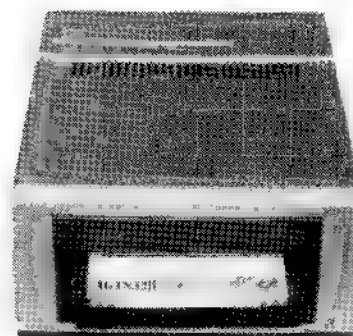
Its the first of these file systems, or Random Access files, that is the most exciting. By using random access files, we are now in the position of using our drive system as a "disk RAM". That means that because of the speed that the drives work at, we can use the disks to store information and send specific information to our programs randomly. Large data files, such as a phone book program, will just access the information you need, and not the entire data file.

File storage is what sets this system apart from the cassette recorder. Now I know what you are saying. Its the speed that sets this system apart from cassettes. Well, that is only half true. It breaks my heart to see people spend the \$350 bucks for a state of the art disk drive system, and use it for just saving and loading programs. No, it is the way that we can manipulate our data files, and not have their size be limited by the computer's memory, that sets this system apart from the cassette recorder.

Whew, sorry about that soap box stuff. I just get that way when I think about how powerful this system is.

Other articles will include using the RS232C ports with a Hayes 1200 modem (I do it now), as well as hooking up a serial printer to them. We will also look at existing programs for the T/S 2068, and how we can convert them for use on the D.D. system.

On that vein, there was one program that I used more than any other, and that was TASWORD TWO. One of the first things I did was to convert it for use with the D.D. system. Lets see how this is done.



The first thing you must do is to exit the program and get into BASIC. Go to line 15, and change the part about LOAD "tascode.cod" to LOAD\* "tascode.cod". Next, go to line 700 and 710 and put an \* in front of the SAVE commands. After that is done, go to line 1030 and do the same for that SAVE command. Just one more line to go...line 2030. There you put an \* in front of the LOAD command. Type in GOTO 700, and there you have it, TASWORD TWO on the Zebra Floppy Drive System.

Now while that is a bare bones change, in the October issue of L.I.S.T.ing (the user groups newsletter from Long Island, New York) my best friend Andy Gippetti did an in-depth conversion of Tasword, that makes it even more powerful. Andy's conversion allows for files from both cassette and disk to be used, and gives you a CATALOG option in the main menu. For a copy of this article or any other statements you may have, feel free to write me at: 21 Regina Dr., Sayville New York 11782. You can also join L.I.S.T., or a more local users group that gets the LIST newsletter. Well, bye for now!



## MACHINE CODE TUTOR

Reviewed by Duncan Teague

### The Complete Machine Code Tutor

Knighted Computers  
707 Highland Avenue  
Fulton, NY 12069  
T/S 2068; \$18.50

Upon opening the black case containing the two cassettes, I recalled a painting that decorates Walker Hall at M.I.T. The painting depicts the Serpent tempting Adam and Eve with the fruit of the Tree of Knowledge. It's Latin inscription says, "you shall be even as the gods, knowing good and evil."

This "apple" from Knighted Computers tempts with insights into and an understanding of the language of machine code programmers, who, as we all know, speak directly to the great god, Z80. In this brief article, I'll tell you first how MCT operates and then how well it performs its intended purpose.

MCT teaches the "instructions" used to communicate with the Z80 microprocessor in the same way a BASIC tutorial teaches the "commands" used in that language. Three techniques are used. The actions performed by the instructions are explained in text.



Examples of the instructions in use are shown by means of a "simulator". The student is allowed to practice using instructions by modifying the examples.

The simulator is loaded first. Experienced pupils can begin practicing using instructions already learned. Alternately one of the sets of lessons can be loaded into the simulator. The lessons are divided into four groups:

- 01-09 Introduction to Registers and Memory; Loading, Comparing, Incrementing, Decrementing
- 10-17 Decision Making: Jumps, Calls, and Stack Operations; Binary, Decimal, and Hexadecimal Notation
- 18-25 Bit Manipulations: Shifting and Rotating; Flags Sign and Parity
- 26-35 Specialized Registers: Index and Alternates; Input/Output and Block Instructions; Interrupts

In each set you advance through a menu/list by pressing the SPACE bar. The ENTER key chooses a "lesson" on a particular instruction or a corresponding "example" demonstrating the use of that particular instruction. During the lesson or example, a BREAK will return you to the menu/list.

The demonstrations run by means of the simulator. A single keystroke by the user runs the demonstration or moves it ahead one step. With each step the current status of every register, memory location, and flag is shown. The user is challenged to understand and eventually learn to predict what will happen.



Once the lesson is sufficiently understood in concept and in practice, you may elect to "edit" the demonstration routine. A user friendly editor makes it easy to experiment by altering either the numerical values used or the instructions themselves.

Internal error messages alert you to invalid instructions or operations which would overwrite the MCT program itself. The user is reminded if a RETURN is not included at the end of the routine. In short the user's routine is not allowed to crash. If the instructions are valid, then they are "assembled".

The assembled instructions can then be run by the simulator one step at a time just as the demonstrations are. This provides the pupil with immediate feedback on how well the concept taught has been understood or mastered.

One of the safe areas with which the user is allowed to experiment is the screen display. The demonstrations often change the attributes of screen locations, so a color display is very helpful, although not essential.

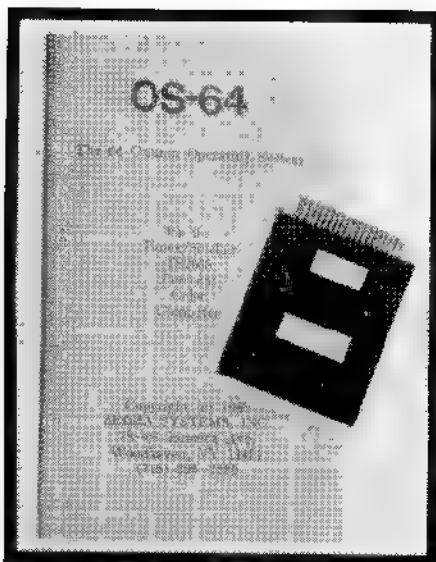
The same 42 character per line "micro-print" used in the Masterfile database program is employed throughout MCT. This allows one-third more text to be displayed on each screen line than the 32 character mode can provide. Despite the smaller letters, the text is clear and easy to read.

The tutorials on the various Z80 instructions make more sense the more times you are exposed to them. They also do a better job of explaining machine code programming than any other book or magazine article I've read. The reason for this is the "explain-predict-control" format of each lesson.

After a cursory look at all 35 lessons, I am still not a machine code programmer. Although I'm not ready to write a whole program in Z80 mnemonics, I was actually able to produce my own short routines to manipulate screen attributes and to move blocks of text around at machine code speed.

The MCT is not the ultimate machine code programming tool, nor is it intended to be. A serious student will eventually have to acquire a good machine code assembler to translate newly learned instructions into the 1's and 0's understood by the computer.

I seriously doubt that anyone has developed an assembler as user friendly (un-crashable) as MCT. An explorer in this new realm will, however, be able to practice routines with the MCT simulator before entering them into a working assembler. Don't expect miracles with The Complete Machine Code Tutor. But a better set of training wheels probably cannot be obtained.



## OS-64

Reviewed  
by  
Tim Woods

One way of looking at the OS-64 Cartridge Software, is an "unfulfilled promise" that has come true for the 2068. All manner of cartridge-based software was to have had a perfect marriage with this computer, such as languages, CP/M, ROM expansion, utilities for bank-switching, and yes, utilities for the extended video modes. The 64 column text mode is one of these modes, that up until now, has barely been utilized (on a wide-scale basis).

The OS-64 Cartridge is a small pc board with an EPROM, a decoder IC, and covered with a thin plastic housing that is spray-painted black. It is somewhat larger than an original Timex cartridge, and has a rather snug fit when inserted into the cartridge dock of the 2068.

The accompanying manual is 12 pages long, and outlines the basic functions of the OS-64. While the language is clear and straight-forward, I have the feeling that some users will want to receive additional information not covered in the manual. Such as an in-depth explanation of how this new system "works", along with system ROM calls, and more details on printer/interface operations.

There are a few limitations that should be pointed out to prospective purchasers of the OS-64. First, it doesn't support the printing routines of the Timex 2040 printer. Instead, it has built-in print drivers for the AERCO, Tasman, A&J, and Oliger printer interfaces. The system defaults to the AERCO (but a simple POKE will select the correct one). The trade off for the 2040 is the full size printer facilities.

OS-64 doesn't use the command FLASH. PAPER and INK have limited effect, and are pre-determined. All graphics commands work normally (255x175), however, the 512 pixel-width mode is accessible by machine code. All other BASIC commands are normal, only now PRINT, LIST, LPRINT, LLIST, ect., are in 64 columns.

When the 2068 powers up, it re-initializes, and the OS-64 takes over. A quite noticeable white characters on black background screen appears. There is no border, as all of the screen is now used. I have only used the OS-64 with a color composite monitor, and the small character definition is fairly readable. The user manual strongly recommends the use of a monochrome or RGB monitor. This would reduce eye-strain over a period of time.

One of the impressive "effects" of this system, is LISTing a BASIC program...no more "wrap-around" of program lines, all information for a line number is on one 64 col. line. This allows for easy editing and debugging of programs.

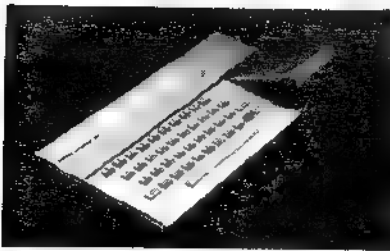
The other important aspect of the OS-64 would be in software development especially for this operating system. I have had the opportunity to preview two such programs.

The first program is called PERSONAL SECRETARY. Unlike other common appointment managers, you can now see a whole screen full of appointments, along with a calender of the month you are working with. Very nice touch. My copy of Personal Secretary was previewed on the Zebra Systems Disk Drive system. Together with the floppy drives, and the OS-64...it was a SUPER operating system!

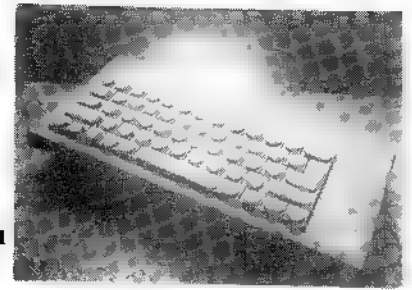
The latter program, is one that you may already be familiar with, if you read my review of the VIEWWORD word processor in the NOV/DEC 85 issue of TDM. Only this is a new version that works with the OS-64. There are many new enhancements (including 64 col. of course) that makes this good little word processor an even better one.

The OS-64 has a few drawbacks, but it does turn the 2068 into a "professional" style operating system. Outside of the Spectrum Emulator, I haven't seen a better use for the 2068's cartridge dock. Put into the right developer's hands, some very interesting and practical software could be written.

OS-64 is available from Zebra Systems, Inc., 78-06 Jamaica Ave, Woodhaven NY 11421 for \$29.95 plus \$3 for total order P&H. PERSONAL SECRETARY software is also available from Zebra on cassette or 3 inch disk. VIEWWORD is available from Jim Claffelter, 3361 Sand Ridge Road, Placerville CA 95667.



# 2068/SPECTRUM WARES



## RAINBOW PLUS

Reviewed by Duncan Teague

The Rainbow Plus Spectrum Interface  
Damco Enterprises  
67 Bradley Ct.  
Fall River, MA 02720  
T/S 2068; \$49.95

You can count the number of ways to run Spectrum software on one hand. If you don't want to to the expense of purchasing a Spectrum Computer, then there are only four:

1. Replace your T/S 2068 ROM with a Spectrum ROM.
2. Use both ROMs, selecting between with a switch.
3. Use an "emulator" that plugs into the cartridge port.
4. Use an "emulator" that plugs into the expansion port.

The first two choices require opening the computer, voiding its (ha!) warranty. Many of us just won't chance messing up our computer through accident or ineptitude. But we're not averse to plugging in something. We've had experience with that technique.

The last two choices involve tying up either the cartridge port or the expansion port. This prevents its use by other peripherals. The choice of which port to use for Spectrum emulation is a matter of what else you want to accomplish.

The Rainbow Plus Interface is a small black box which plugs into the 2068 expansion port. A switch on the left rear changes its operating mode from T/S 2068 to Spectrum. Instructions advise powering off the computer before installing the interface.

The Rainbow Plus Interface allows the access to the whole line of Spectrum software, but that's not all it does. Its operating system is on an eprom. This makes possible the correction of some flaws in the Spectrum ROM. The Rainbow Plus also has a Spectrum compatible edge connector. This renders the entire line of Spectrum hardware peripherals available as well.

When you turn on the computer with the interface in Spectrum mode, your computer first initializes in T/S 2068 mode. Then it

re-initializes in Spectrum mode. Instead of the normal copyright notice, you see "Sinclair Spectrum Mod. B."

This modification refers to the fact that several known bugs in the Spectrum ROM have been fixed. One unexpected feature is the inclusion of 21 user-defined graphics symbols. They include the superscripts 0-9, six letters from the Greek alphabet, and five other symbols of marginal utility.

In this mode you can load Spectrum software. All 24 of the programs I tried, loaded with no difficulty. I had a nice surprise with the PAINTBOX graphics utility and drawing program. Paintbox has 84 udg's that are available. Along with the 21 already contained in the Rainbow Plus eprom, my version of Paintbox now has 105 udg's that can be edited, used, and saved to tape.

I also had the opportunity of testing a couple of Spectrum peripherals with the interface. The DK'Tronics Light Pen and the DK'Tronics Sound Synthesizer worked equally well. I will report in detail on these peripherals in subsequent reviews.

While the Spectrum compatible hardware works fine, it should be noted that T/S 2068 hardware does NOT work when attached to the rear of the Rainbow Plus. A TS 2068 printer interface, for example, must be attached first to the computer. Then the Rainbow Plus can be piggy-backed onto the TS 2068 hardware.

Two exceptions to 2068 hardware incompatibility with the Rainbow Plus interface should be noted. The 2040 thermal printer and the 2050 modem CAN be used behind the Rainbow Plus.

I find the Rainbow Plus Interface extraordinarily easy to use. Installation on the expansion port is easier than opening up the computer. In operation it's more reliable than some other devices. By this I mean that the Spectrum mode initializes 100% of the time. This is not so with the ROM switching technique.

The use of the expansion port is a problem for me. My parallel printer interface doesn't have a rear edge connector of

its own. I can't plug it in first and then attach the Rainbow Plus. But that's a problem with my printer interface, not with the Rainbow Plus.

The eeprom operating system with the corrected bugs and stored udg's is superior to other devices which employ a standard Spectrum ROM. Its software compatibility and firmware features, coupled with support of Spectrum hardware devices, make the Rainbow

Plus Spectrum Interface the optimum choice among several possibilities for Spectrum emulation.



---

## ASTRONOMER

Reviewed by Paul Bingham

Program: ASTRONOMER

Type: Educational/Technical

Machine: Spectrum or 2068 with Spectrum ROM

Length: 48K

Price: \$14.95

Written in: Machine Code

Listable: no

Manufacturer: CP Software

Author: Paul Marshall

As an avid fan of astronomy, I have kept my eyes open for a 2068 program that could aid my star gazing interests. Eric Burgess' book More Uses for Your TS 1000: Astronomy on Your Computer was all I had found until now. Another book of his, Celestial Basic, has been useful. It is similar to the other but examples are for the Apple IIc.

ASTRONOMER by CP Software of England is an impressive package. It comes in a colorful box along with a professional sixteen page typeset instruction booklet. This is well written and though brief, adequate.

Using Doug Dewey's OMNI-EMU ROM board, ASTRONOMER loaded and ran without a hitch. I did load side two, which is just another copy. It loaded but appeared to fail completing its setting of bits in the UDG area before self-running. It later crashed.

The program takes 4 min. 40 sec. to load. Colorful graphics make the wait bearable. The opening menu lists six options. Option No.1 allows the user to enter the exact latitude and longitude, the time (to seconds), and the date for anywhere on the earth. This program throughout is very, very accurate. Options 2 and 3 give the user coordinates for his date and time of the planets, sun, moon, four of the largest asteroids, comet Encke, and yes, Halley's comet, too. This and most information is easily printed out on the 2040 thermal printer. Options 2 and 3 allow the user to ask for

the coordinates over a range of times and dates as well. Since most of the information is useful only to telescope owners, it may be less important than the other options.

Option 4 is the most complex. Here the computer calculates and stores the position of 1090 stars (to magnitude 4.75) which are visible under normal conditions to the human eye. This is more stars than is shown on my Planisphere! It divided the night sky into five parts, treating the sky as a huge dome. The top is circular when cut out--this is part five. The rest is divided up equally into north, east, west, and south panels--parts one through four. These views can be chosen and within 25 second (2 min. for the circular part five) all the stars to magnitude 4.75 are plotted out. Faint stars are single pixel points, brighter stars more. The display is colorful and impressive. By entering any of the 79 constellation codes ASTRONOMER will trace out each (see fig. A). By re-entering the same code, it erases the lines it drew in. This is remarkable! There is even a code ALL which traces out all of the constellations. This takes nearly ten minutes.

Option 4 requires a calculation time of 10 min. 48 sec. the first time through. Once completed, the user can skip from option to option and to any view in option 4 without needing to recalculate anything. Only if the user changes the date, time or location using option 1 will option 4 require this period of re-calculation. The computer beeps loudly when done, in case the user has left the room.

Option 5 is in a way a close-up or zoom of the views in option 4. Option 5 splits the sky into 362 overlapping charts of 20° Declination and 2 hour Right Ascension..... telescope coordinate values. As in option 4, option 5 will allow tracing of constella-



its own. I can't plug it in first and then attach the Rainbow Plus. But that's a problem with my printer interface, not with the Rainbow Plus.

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Option 5 is in a way a close-up or zoom of the views in option 4. Option 5 splits the sky into 362 overlapping charts of 20° Declination and 2 hour Right Ascension..... telescope coordinate values. As in option 4, option 5 will allow tracing of constella-

tions. Fig. B (Lupus the Wolf) and Fig. A are given for comparison.

In both options 4 and 5, the location of all the objects available from options 2 and 3 (i.e. the planets, comets, ect.) can be superimposed among the constellations by using their three-letter codes. The position is shown as a tiny plus sign which blinks three times then remains. Entering the code again works in reverse and removes it. I found some star regions so busy with stars so as to miss the blinking plus sign the first time. Fig. C and D show all of the planets lined up with the setting sun on March 10, 1882. This answers a query put forth by Duncan Teague in the Jan/Feb '85 issue of SYNCWARE NEWS for which a prize was to be awarded. (Does this mean I win?)

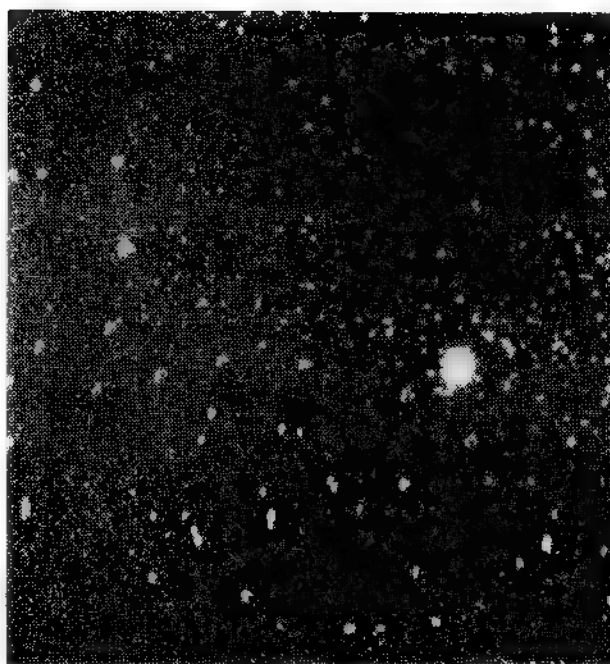
Option 6 lets the user find the rising and setting times of the solar system objects or to see an animated view of the solar system itself (see Fig. E). The user inputs the starting date and interval. The motion of the planets continues until the user stops it. This animated view I have found to be very educational and easily understandable by my small children.

ASTRONOMER is a very thorough and complete program. It can grow with the observer as the observer's needs grow. It is also worthwhile to those following Halley's Comet or as an educational device.

Is ASTRONOMER perfect? No, it has a few drawbacks. In option 4 or 5 the user may be annoyed by a "POSITION NOT CALCULATED" ..... message accompanied by a loud beep when entering the code for a solar system object. As it turns out, the position of each object to display in option 4 or 5 must first be called up in its menu in option 2 or 3. This is a four-key procedure for each object.

This boils down to TIME. The user must figure on 4:40 to load the program initially 4:30 to run through the four-key procedure for all the objects, 3:00 to change the date, time and location (which comes set for London, 1/1/84), and 10:48 for the initial sky calculations in option 4. The grand total is 23 minutes or so to get ready.

If I could make all the changes in 23 minutes and then SAVE the program it would be fantastic. Even a back-up copy would be nice to have. However, being a self-running machine code program, no provision for such is included. I have tackled ASTRONOMER using 007 SPY and have managed to make a back-up copy after several nights and lots of head-scratching. This is however only a copy as it comes from England. Maybe with HOT Z II I



could wade through the 46K of data and find the bytes I need to alter...or maybe not.

At any rate, ASTRONOMER is an excellent aid to most any level of interest in astronomy. It works well, is professional, and at \$14.95 is an exceptional value. Similar programs for the PC start at \$65. My OMNI-EMU and ASTRONOMER together were less money. It is a good way to get ready for Halley's Comet and much more. It rolls into one at least eleven of the 20 programs in Burgess' book. The printouts do not do the real graphics justice--see the program for yourself.

ASTRONOMER is available from: Curry Computer, 5344 W. Banff, Glendale AZ 85306, for \$14.95 plus 90¢ shipping.

---

```

      NAME
      DATE
      TIME
      LOCATION
      DISTANCE
  
```

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Continued next page...

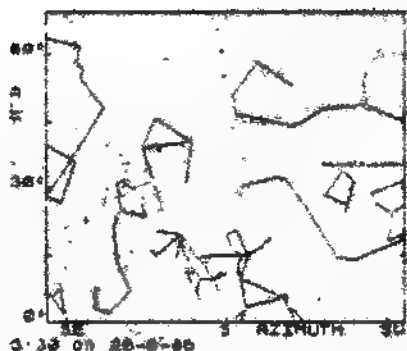


Figure A

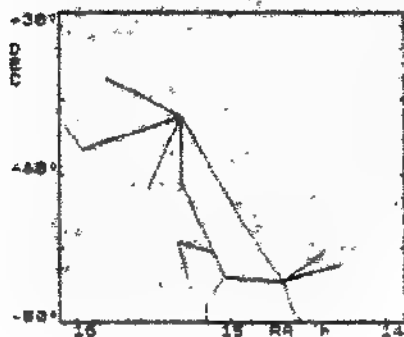


Figure B

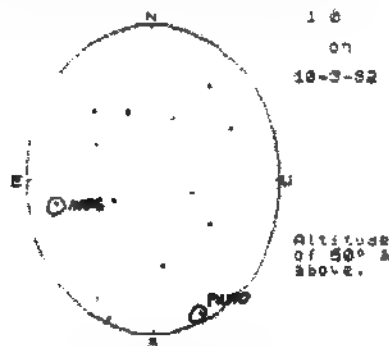


Figure C

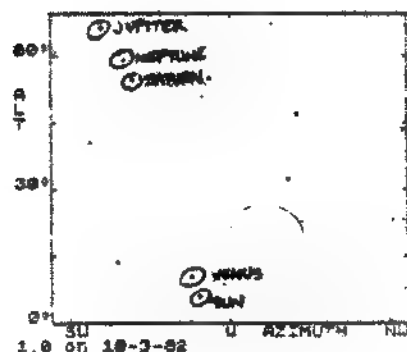


Figure D

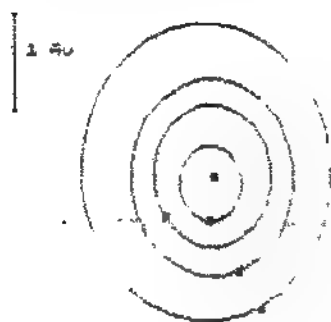


Figure E

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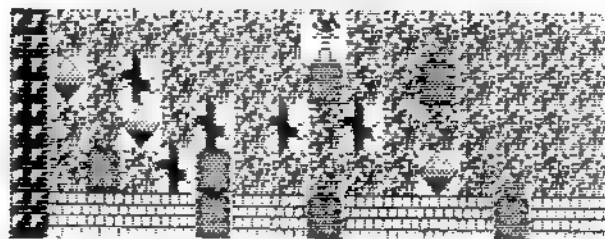
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**TIME-DESIGNS** Sept/Oct 85 Page 17...

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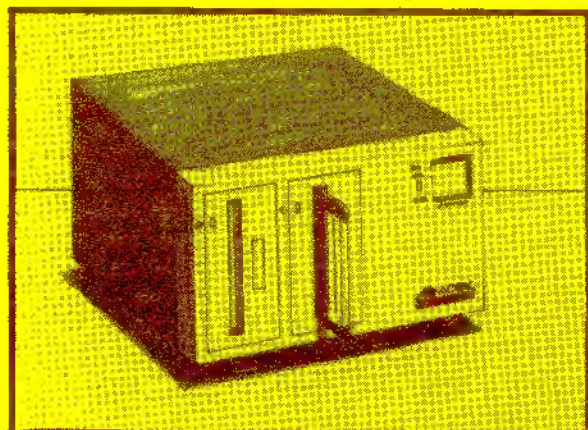


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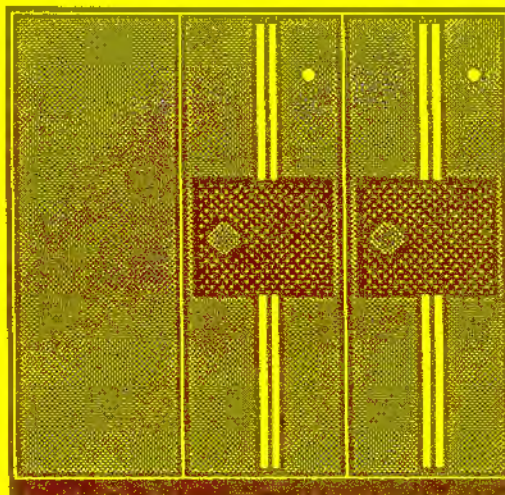
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